DOCUMENT RESUME

ED 224 709 SE 039 829

AUTHOR	O'Conner, Maura; McGlauflin, Kathy
TITLE	Living Lightly in the City. An Environmental Education Curriculum for Grades 4, 5, and 6.
INSTITUTION	Schlitz Audubon Center, Milwaukee, WI.
PUB DATE	82
NOTE	179p.; Project financed by the Edward A. Uhrig Foundation, Rexnord Foundation, Inc., Milwaukee Foundation, Friends of the Schlitz Audubon Center, and Mr. and Mrs. Webster Woodmansee.
AVAILABLE FROM	Schlitz Audubon Center, 1111 E. Brown Deer Road, Milwaukee, WI 53217 ($10.00 plus $2.50 tax, postage, and handling).
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Ecology; Energy; *Environmental Education; Environmental Influences; Grade 4; Grade 5; Grade 6; *Interdisciplinary Approach; Intermediate Grades; Land Use; *Learning Activities; *Natural Resources; Recycling; Transportation; *Urban Environment; *Water; Water Quality

ABSTRACT

This curriculum provides grade 4-6 urban children with hands-on activities that will build their understanding of and concern for their environment. The urban environment is viewed, not as a negative, non-wilderness place; but as a place where people can learn to have an influence on their surroundings. The curriculum consists of 11 units written around such broad concepts as transportation, urban sprawl, water and water consumption, ecology, recycling, water quality, natural resources, economics, and others. Within each unit are activities designed to be infused into the standard subject areas. This interdisciplinary approach provides activities which "environmentalize" concepts already taught in the upper elementary curriculum. Activities are designed to be used in the classroom, on school grounds, and in the immediate urban environment. The approach is hands-on and the focus is on the student's relationship to the earth. Each unit consists of an introductory sheet highlighting unit topics/activities, list of concepts fostered, ways to introduce the unit, student activities, and student activity sheets. Objectives, materials needed, time required, and instructional strategies are provided for each activity. (Author/JN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

SE

ED224709

LIVING LIGHTLY IN THE CITY

An Environmental Education Curriculum
For Grades 4, 5 and 6

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Written by
MAURA O'CONNOR
KATHY McGLAUFLIN

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
Maura O'Connor

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Illustrations by
NANCY CHENERY

SE039829

SCHLITZ AUDUBON CENTER
1111 East Brown Deer Road
Milwaukee, WI 53217

Acknowledgments

Grateful acknowledgment is given to the Friends of the Schlitz Audubon Center for their continuing support of the Urban Environmental Education Program for the public and private schools of Milwaukee. The Friends Board of Directors were quite active in helping to secure financial support for both the field work and the writing that produced this document. Our special thanks go to former Center Director Don L. Danielson for starting the project and to Dr. Richard F. Ashley for guiding it to completion. Layout, typing, and editing of the manuscript was done by Lisa MacLaren and without the illustrations by Staff Artist Nancy Chenery, this document would not have reached its current level of quality.

A special thank you goes to Dr. Don Neuman for his general assistance and his timely advise in the development of these materials.

Two interns, Meg Carver and Janet Nortrom, were most helpful while the material was being field tested in the classrooms of many schools.

We would also like to extend our gratitude to the following teachers who opened their doors to new curriculum ideas and, in so doing, opened their student's perceptions of the world around them. They are Dave Gawlick (Granville School), Maureen Mallo (MacDowell School), Cherrye Trotman (Palmer School), Pam Quale (38th Street School), Mona Ealy (Auer Avenue School), and Ellen Croke, Marsha Darneider, Lee Englund, Don Janicki, Marilee Laumann, and Janette MacMurdo (Lloyd Street School).

This project was financed by the following foundations and individuals: the Edward A. Uhrig Foundation, the Rexnord Foundation, Inc., the Milwaukee Foundation, Mr. & Mrs. Webster Woodmansee, and the Friends of the Schlitz Audubon Center.

Table Of Contents

What It's All About 1
Checking Out The Neighborhood 6
Looking Back 14
Back To Basics 24
Going Places 34
Water, Water Everywhere 41
Natural Neighbors 49
Less Is More 63
Enough for Everyone? 76
Movin' Out 89
Water We Losing? 106
Things Could Be Different 119

WHAT IT'S ALL ABOUT....

Children living in urban areas have traditionally been introduced to environmental education through "plant study" units or "animal study" units augmented by an annual or semi-annual outing to a natural setting. These brief sojourns into the world of nature provide a good foundation for developing an environmental ethic. Unfortunately, the building blocks for environmental knowledge and concern usually aren't built on to that foundation, and as a result, we continue to see the decline of environmental quality.

The Living Lightly In the City curriculum is an attempt to provide children with hands-on activities that will build their understanding of and concern for their environment. The materials are aimed at helping the urban child to bridge the gap between the world of nature and their own urban-centered environment. They are designed to raise a child's curiosity about the source of their water, food, energy, and resources consumed every day. The urban environment is viewed, not as a negative, non-wilderness area, but as a human-dominated environment, an exciting place, where people can learn to have a more moderate influence on their surroundings. They can adopt lifestyles which lead to a more harmonious relationship to the land by "living lightly in the city". To live "lightly", one has knowledge of his/her relationship to the land and uses that knowledge effectively when making consumer choices and lifestyle decisions. For instance, choices to take public transportation, recycle resources or grow one's own food, could all lead to a "lighter" lifestyle and a higher quality environment.

We are concerned that the quality of our environment is deteriorating. As the interwoven fabric of our environment begins to unravel, the quality of our lives and our childrens' lives declines with the environment. We feel it is essential that urban children learn to recognize that they, too, are a part of nature and that their individual actions can positively or negatively influence their environment. If we are ever to achieve a lifestyle in harmony with the land, we must become stewards of, not merely users of the Earth's resources. This will require that each child adopt an environmental ethic, recognizing the interdependency of the urban environment with the natural world and realizing how one can live more lightly to enhance the quality of life now and for generations to follow.

What It's All About. Copyright 1982, Schlitz Audubon Center.

WHAT WE'D LIKE TO ACHIEVE......

The Living Lightly In the City units are designed to help students:

- increase awareness and appreciation for the diversity of natural and human-made components of the urban environment.
- understand the concept of interrelationships in the context of natural and cultural communities.
- realize how the urban environment is related to the natural environment through the water cycle and the flow of raw materials used in manufacturing goods.
- understand how our needs and wants as consumers are provided from natural resources and distributed through neighborhood services.
- develop communication skills in describing their values.
- examine their lifestyles and increase their awareness of the positive influence they can have on the environment.
- gain an appreciation for natural areas and realize the need to protect these areas.
- develop an environmental ethic, recognizing their responsibility to live in harmony with the land.

LIVING LIGHTLY UNITS AT A GLANCE

Checking Out The Neighborhood

An investigation to promote the understanding of the diversity of natural and human communities by looking at places people live and work as well as the natural elements of a neighborhood.

Looking Back

A study of the historical and cultural aspects of a community from an environmental perspective.

Back to Basics

An exploration of goods and services in a community and their relationship to our needs and wants as consumers.

Going Places

A study of our transportation systems' impact on the land, people, and on natural resources.

Water, Water Everywhere

A study of the water cycle and the cyclic process of water consumption and treatment in the city.

Natural Neighbors

An exploration of the interaction between animals and plants in the urban environment and the dependence of cities on natural communities.

Less Is More

An investigation of the process of recycling in nature and how people can recycle resources to make more out of less.

Enough for Everyone?

An investigation of our use of natural resources and the importance of conservation as a means of dealing with these limited resources.

Movin' Out

An examination of problems related to urban sprawl and some solutions to these problems.

Water We Losing?

A study of water quality issues and problems related to wetland drainage and soil erosion.

Things Could Be Different

A study of the Native Americans' harmonious relationship to the land and how people today can learn from that philosophy to live in harmony with the Earth.

What's It All About? Copyright 1982, Schlitz Audubon Center.

HOW THE MATERIALS COULD FIT INTO YOUR CURRICULUM

Living Lightly In the City consists of eleven units written around broad topics such as, transportation, urban sprawl, water consumption, etc. Within each unit are student activities designed to be infused into the standard subject areas. This interdisciplinary approach provides activities which "environmentalize" concepts already taught in the upper elementary curriculum. It is thus, not a new subject to be squeezed into a crowded curriculum, but rather, a new, and hopefully enjoyable, way of teaching fundamental skills.

The activities are designed to be used in the classroom, on the school grounds, and in the immediate urban area. The approach is hands-on and the focus is on our relationship to the Earth. The first six units are centered on investigations of the immediate environment - the home, school, and neighborhood. Students are encouraged to take a fresh look at their surroundings through the eyes of an artist, a mathematician, a builder, an historian, and an economist; all with an ecological perspective.

The last five units expand upon some initial concepts introduced, to examine one's values concerning local, and to some extent, global environmental concerns. Although the units were designed so that the first six are more local with somewhat introductory activities, they were also written as separate units to facilitate their incorporation into a school's curriculum. They can be taught separately or in a more sequential manner. Following are some suggestions for incorporating these materials into the elementary curriculum:

- Incorporated into the existing curriculum as language arts, social studies, science, art or math lessons.

- As separate units on broad topic areas such as transportation, water study, land use, economics and consumerism, population and resources, etc.

- As lessons in skill areas to improve fundamental skills, such as observing, computing, communicating, writing, etc.

- In sequence, presented as a unit on the urban environment.

- As learning centers set up in the classroom for children to progress through at their own pace.

WHEN YOU ARE READY TO GO OUTSIDE.....

Many of the activities are designed to be carried on outdoors. For the trips to natural areas, contact a local nature center or park for assistance with planning, equipment and personnel. For the local outdoor investigations in the area around your school, you may wish to have a parent or an aide assist you. You will find that as students become accustomed to using their school grounds as a learning laboratory, they will be less likely to view your ventures into the outdoors as a "recess" from learning.

The activities in the first unit, Checking Out the Neighborhood, are designed to be initial outdoor investigations. The activities are brief and simple since they are intended to initiate your students to the idea of learning in an outdoor environment.

Many of the student activities to be conducted outside have a student activity sheet to accompany them. The sheets are provided to keep the children on task, focused on the investigation at hand. If your students find it difficult to write outdoors, go over the questions in the classroom and have them work with the activity sheets when they return. If they use the sheets outside, have them make "write-upons" using heavy cardboard, cut to slightly larger than 8½" x 11" sheets. Their papers can then be secured to these writing surfaces with rubberbands or thumbtacks. Pencils could also be secured to the cardboard surface with string.

We would like to hear from you! Please let us know how these materials worked for you and your students. There is an evaluation form in each unit asking for your input. We are interested in your students' reactions as well. Your comments and feedback will be most appreciated. Please direct completed evaluations to:

Urban Environmental Education Program
Schlitz Audubon Center
1111 East Brown Deer Road
Milwaukee, WI 53217

TEACHER'S EVALUATION

What were the weak points in this unit?

What were the strong points?

Was there adequate teacher information provided? If not, what else is needed?

What changes would you suggest in the material?

Did you adapt other extensions or follow-ups to the activities? What were they?

Unit taught ______________________________ Grade level __________

Please return to: Urban Environmental Education Program, Schlitz
Audubon Center, 1111 East Brown Deer Road,
Milwaukee, Wisconsin, 53217
ATTN: Maura O'Connor

STUDENT'S EVALUATION

Did you like the Living Lightly In the City activites? Why or Why not?

What did you like the best? Why?

What did you like the least? Why?

What do you feel was the most important thing you learned from these studies?

Please return to: Urban Environmental Education Program, Schlitz
Audubon Center, 1111 East Brown Deer Road,
Milwaukee, Wisconsin, 53217
ATTN: Maura O'Connor

CHECKING OUT THE NEIGHBORHOOD

Activity	Focus	Activity Sheet	Subject Area
Shelter In the Neighborhood	Living environments	x	Social Studies History Science
Places People Work	Neighborhood facilities, needs provided and impact on environment	x	Social Studies Science
Nature In the Neighborhood	Plant and animal diversity and interrelationships	x	Science
Find It On My Map	Mapping skills and neighborhood awareness	x	Social Studies Language Arts

Checking Out The Neighborhood. Copyright 1982, Schlitz Audubon Center.

CHECKING OUT THE NEIGHBORHOOD

TEACHER INFORMATION

CONCEPTS:

MILWAUKEE ST.
WI
NSIN ST.

Discovering the diversity in natural and human communities.

Understanding the impact of neighborhood facilities on the local environment.

Examining means of improving a neighborhood through addition of services, building maintenance, and natural landscaping.

Investigating some relationships between plants and animals in the city.

The activities in this packet are introductory lessons designed to help students develop an awareness and appreciation of their immediate environment. The first three activities are short outings into the immediate environment. They can be done separately or can be combined into one longer activity.

Note: The activity sheets provided refer to "your" neighborhood. Since many of the children in the class may live in neighborhoods other than the one surrounding your school, you may want to have them complete the activity sheets as an outside assignment in their own neighborhood after they've investigated the school neighborhood. It is sometimes difficult to have students fill in surveys while on walking tours outside. You may want to appoint a few students to be recorders to alleviate this problem.

To begin this unit discuss the concept of a neighborhood or community with your class. You could ask your students to think of all of the things one might find in a neighborhood. List their answers on the board in three categories: a) places people work; b) shelters, and c) nature in the neighborhood. Additional questions to ask: Do we need all of these things to make up a neighborhood? What is missing in your neighborhood? Which things on this list are absolutely necessary for a neighborhood to function? What kinds of things (shelters, businesses, nature) are in this neighborhood? Let's find out!

Checking Out The Neighborhood. Copyright 1982, Schlitz Audubon Center.

SHELTER IN THE NEIGHBORHOOD

OBJECTIVE: Students will describe the various forms of shelter and qualities which lead to good maintenance of living environments.

MATERIALS: Activity sheets provided, hard writing surfaces for outdoors (cardboard piece or books)

TIME: 1 hour

Review the questions on the activity sheet before you begin your walk. If all of the shelters are similar discuss what other kinds of shelters could be found in a neighborhood. Children could also talk about the kinds of homes they live in. Along the way, stop to examine shelters your students feel are being well cared for. Discuss the qualities which make them special, such as good maintenance and upkeep, use of storm windows, plantings in the yard, garbage cans with lids, etc. Ask why these qualities improve the living environment. Discuss the importance of garbage cans with secure lids in reducing litter and keeping the rat population down. Discuss the qualities of plants which improve our living environment such as the aesthetic qualities, attracting song birds, providing noise barriers, filtering our air, etc.

PLACES PEOPLE WORK

OBJECTIVE: Students will examine the services provided by local businesses and their impact on the local environment.

MATERIALS: Activity sheets provided; pencils, portable writing surfaces.

TIME: 1 hour

Take your students out to investigate businesses and services in the neighborhood. If there are no facilities in the neighborhood around your school, visit a neighborhood which provides services and discuss the lack of businesses in your immediate area. As the students examine services provided and impacts of businesses on the local environment some positive and negative features will surface. Students will probably realize that services such as police and fire protection don't need to be located in the immediate neighborhood. They may later want to locate these services on a city map. If there are no "corner stores" the need for transportation to obtain food and supplies could be discussed.

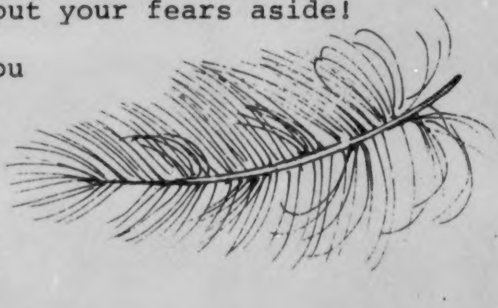
GROCERY STORE

Examine the impact of the businesses on the local environment. Discuss possibilities for eliminating any negative impacts. You may want to wait until you've returned to the classroom to have the children think more carefully about neighborhood needs before writing about other businesses and services they would like to see provided.

NATURE IN THE NEIGHBORHOOD

OBJECTIVE:	Students will become more aware of the diversity of nature in the neighborhood and the relationship between plants and animals.
MATERIALS:	Activity sheet provided. (optional - magnifying glasses)
TIME:	1 hour

Tell your class you are going out to examine the "other" living things in the neighborhood. Once outside take a walking tour of the community and stop to examine plants and animals (or animal clues) along the way. Caution the students to respect others' property. For close-up investigations examine the bark of street trees, the critters in the leaf litter that accumulate under bushes, and turn over rocks or boards on the school grounds or in vacant lots. Some of the clues the children might find to the presence of animals include tracks, nests, animal droppings, feathers, cracked nut shells, etc. The various plants which provide food and shelter could include trees with nesting cavities and acorns or hickory nuts for food. Berry-producing shrubs also provide food as well as cover and support for nests. Note: If you feel you don't have adequate information on the names of animals and clues to their whereabouts, put your fears aside! There is nothing wrong with saying "I don't know, let's find out!" (even if you do know the answers.) The emphasis here is on exciting your students' natural curiosity about other living things and not on specific names or facts.



FIND IT ON MY MAP

OBJECTIVE:	Students will improve mapping skills while summing up their increased awareness of the neighborhood.
MATERIALS:	Activity sheet provided; colored pencils or marking pens, other examples of maps.
TIME:	Optional home or classtime activity 1 hour

This activity should be conducted after your students have investigated the school neighborhood. It has been left open-ended to allow them to sift through the various components of the neighborhood and identify features they are impressed with or feel are important. Have them share their completed maps with each other and initiate a discussion about the "quality" of the environment, how the neighborhood makes them feel, possibilities for improvement, etc. You may want to set aside a neighborhood bulletin board for this activity and those that follow in some of the other units.

Extensions...

Interviews with local business owners or homeowners may provide an interesting supplement to this activity. You may want to contact your city redevelopment organization to bring in a resource person familiar with local efforts to revitalize your community.

Each student could choose a plant or animal in the local community that they would like to be. A creative writing exercise could be built around their ideas about life as a particular plant or animal in the city.

Students could identify projects which would improve their neighborhood and begin working on them.

Have students think of all the adjectives which could describe their neighborhood and list which are positive or negative.

Checking Out The Neighborhood. Copyright 1982, Schlitz Audubon Center.

SHELTER IN THE NEIGHBORHOOD

FLOWER SHOP
FOOD

1. Do people live in different kinds of shelter in your neighborhood? List all of the kinds of shelter you can find.

2. Find the shelters in the neighborhood that you feel people are taking good care of. For each shelter check on the following items and answer yes or no.

Is the shelter in good repair, painted, sturdy etc.?	Does it have garbage cans with lids?	Does it have storm windows to save energy?	Is the yard litter-free?	Does it have plantings?
1)				
2)				
3)				
4)				
5)				
6)				

3. What kind of shelters would people have lived in here 200 years ago? Would you have liked to live here then? Why or why not?

PLACES PEOPLE WORK

Are there places for people to work in your neighborhood? List these places and decide if they are a business which sells goods or a service, like library or fire station.

Work Place	Check one: Business	Service

Put an "X" next to the above business or services you or your family use. (If this is not in your neighborhood put an "X" by those you would use.)

List the needs of people that are being met by facilities in your neighborhood. Which needs are not being met? What other businesses or services would you like to have here?

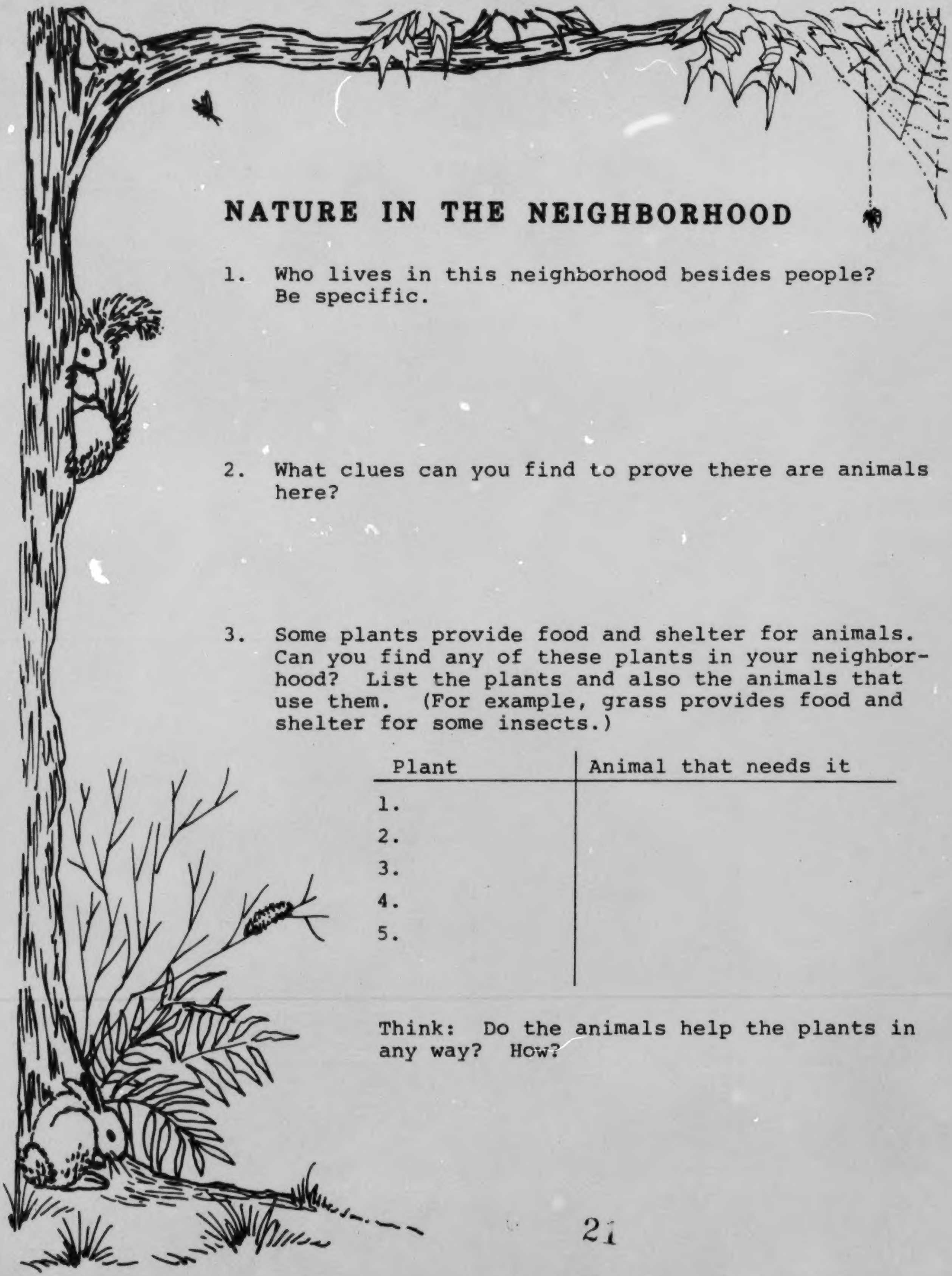
SHIRT FACTORY
HOSPITAL
GROCERY STORE

Checking Out The Neighborhood. Copyright 1982, Schlitz Audubon Center.

What impacts are these businesses or services having on your neighborhood? For instance do they ;

	YES	NO
Bring in traffic?		
Beautify the neighborhood? (nice building, plants, etc.)		
Pollute the water?		
Pollute the air?		
Use up open space for parking lots?		
Use big signs or billboards?		
Create loud noises?		
Provide a nice place to be in?		

How do they make the neighborhood a better place to live?



NATURE IN THE NEIGHBORHOOD

1. Who lives in this neighborhood besides people? Be specific.

2. What clues can you find to prove there are animals here?

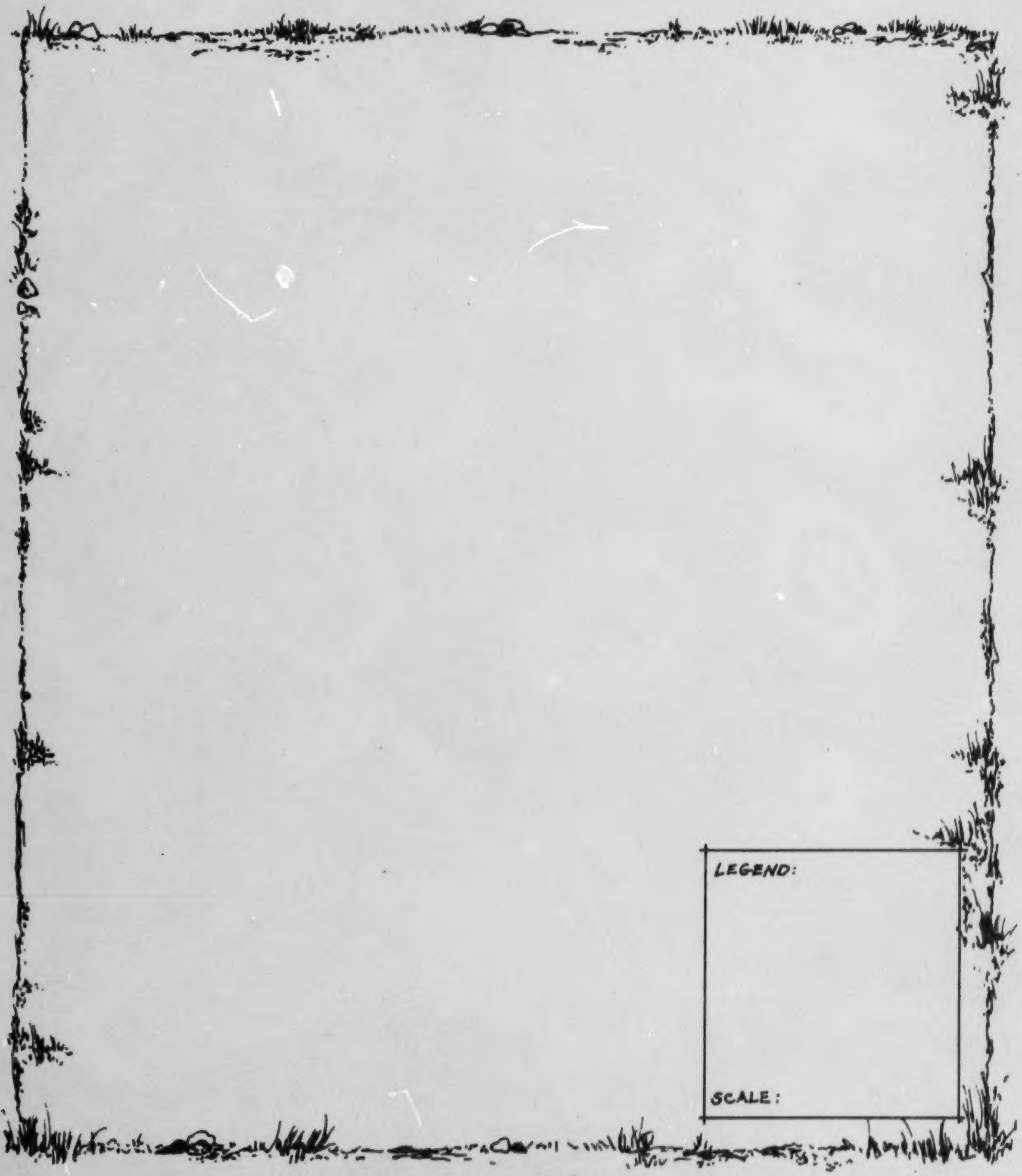
3. Some plants provide food and shelter for animals. Can you find any of these plants in your neighborhood? List the plants and also the animals that use them. (For example, grass provides food and shelter for some insects.)

Plant	Animal that needs it
1.	
2.	
3.	
4.	
5.	

Think: Do the animals help the plants in any way? How?

FIND IT ON MY MAP

Make a map of the neighborhood around your school. Make symbols for things that you feel are important and locate them on your map. On the other side of this sheet write a paragraph describing the neighborhood.



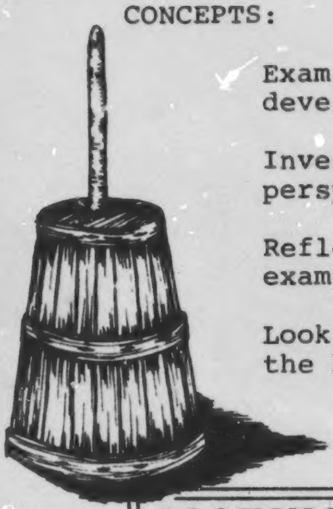
LOOKING BACK

Activity	Focus	Activity Sheet	Subject Area
Looking Back	Cultural and environmental influences relating to the city's past		History Science Social Studies
Tree History	Tree growth and recalling significant events	x	Science History Social Studies
Vacant Lot Archaeology	Cultural awareness and our relationship to the land	x	Social Studies Language Arts
Rocks To Buildings	The Rock Cycle and building materials from the earth	x Transparency needed	Science Social Studies

Looking Back. Copyright 1982, Schlitz Audubon Center.

LOOKING BACK

TEACHER INFORMATION



CONCEPTS:

Examining cultural and environmental influences on the development of urban centers.

Investigating local and national history from the perspective of annual growth of trees.

Reflecting on our relationship to the environment through examination of "artifacts" from our culture.

Looking back to the origins of structural materials in the built environment.

LOOKING BACK

OBJECTIVE:	Students will examine cultural and environmental influences relating to their city's past and contrast them to the present-day environment.
MATERIALS:	Old books, photos, maps, etc. depicting your city's past.
TIME:	1-2 weeks depending on interest development of students.

To begin this unit ask your students to reflect on the many ways life would have been different in their city 100, or even 200 years ago. Encourage them to think about the differences in technology, transportation, and recreation. Generate a list of research possibilities from the class discussion. Have the students then form investigative teams or work individually to explore their areas of interest. They could investigate some of the following questions or topics:

> What kinds of appliances do we have today that people didn't have 100 years ago? How did people get by without them? How do they improve, or not improve our lives?
>
> Who were the first settlers in this region? How were their lifestyles different from ours? What kind of homes did they live in? What did they do for recreation? What kind of transportation did they use?

Why is our city located where it is? (Are local resources, favorable climate, or proximity to transportation routes factors in its location?)

When was the first park established here? What other natural or historic resources have been protected? Was there a citizens' group active in having local resources conserved? Are they still active today?

Have your students start a "Looking Back" bulletin board or display on which to exhibit the important dates, old articles, and photos they find. A display has the advantage of being mobile which would allow your students to present it to other classes or organizations. Your city's historical society would be a good resource for this activity. Ask someone from the historical society to visit your classroom to share old pictures and stories with your class.

When your students have finished gathering information about your city's past, have them review what they've learned and draw some conclusions about their city then and now. Discuss the relative advantages and disadvantages of living in their city in the past or present. Also determine which era had the most negative impact on the city's environment.

TREE HISTORY

OBJECTIVE: Students will examine important events which have occurred in their lifetimes while learning about the growth of trees.
MATERIALS: Cross-section of a tree branch (or find a tree stump near your school), newsprint, crayons, issues of weekly news magazines.
TIME: 1-2 hours

Each year a tree "grows" an annual ring. Trees experience their greatest growth during spring. The wider, light rings represent spring growth and the dark bands represent summer growth. Together they form an annual ring.

Find a cross section of a large tree branch or take your class out to study the growth of a tree from a tree stump. Try to find one with at least 10 annual rings to correspond with the age of your students. If you find a tree stump near your school, have the students do a "rubbing" of the annual rings using crayon and newsprint. Discuss the process of tree growth with them, count the rings, and figure how old the tree was. Bring the rubbing back to the classroom and assume the tree was cut within the last year

26

(unless you are aware of the actual date). Place the rubbing on your "Looking Back" bulletin board and either write in important years or dates or connect a piece of yarn from a significant past event to the corresponding ring on the tree. Neighborhood and/or school events should also be included.

Distribute the tree history activity sheets to your students. Ask them to count back to the year they were born (assume the outer ring represents the current year.) They should then list significant events in their lives corresponding to years of the tree's growth. Encourage them to list significant national or world events, such as the passage of the Clean Air Act. Allow time for library research and provide them with past issues of weekly news magazines as references for this activity. Have students share their "events" with their fellow classmates. Were there any events which a majority of students recorded as significant? Can students discern any trends, particularly in environmental events, over the last ten years?

VACANT LOT ARCHAEOLOGY

OBJECTIVE: Students will determine how the "artifacts" of our culture reflect our relationship to the environment.

MATERIALS: Student activity sheet provided, clipboards, or portable writing surfaces, pencils, string. Optional: small spades and strainers

TIME: 1 hour

Locate a vacant lot near your school as a site for an "archaeological" investigation. Prepare students for the activity by telling them they are being sent as an investigative team from planet Earth to a distant planet in our galaxy. Their mission is to find out if there were people on the planet and how far they had advanced. They are also to draw some conclusions about the kind of relationship these people had to their land. Before leaving the classroom divide your students into teams. Give a

Looking Back. Copyright 1982, Schlitz Audubon Center.

copy of the student activity sheet to each team and review the questions with them. Each team could be responsible for answering all of the questions or for just one or two different items. The writing exercise at the end should be done individually when students return to the classroom.

When you arrive at the vacant lot remind your students to limit their investigations to the lot itself by telling them to imagine that their spaceship has just landed. They should imagine that the entire surface of the planet looks like the lot with no other buildings or traffic in sight.

Use string to divide the lot into 4-6 grids. Assign each team to an area of the lot for their investigation. Encourage them to explore the area within their grid very carefully. You may want to have a few small spades or trowels and some strainers or sieves to enhance the activity. If the lot is covered with lawn, be sure to obtain permission from the landowner before disturbing the site. However, most of the students' finds will be on the surface with little or no digging necessary. Provide bags to collect "artifacts" and/or litter.

Some of the "clues", which may or may not be evident to your students, can be found in the litter and some will be revealed by the site itself. For example, mowed grass is an indication of machinery as are car tires. The presence of plastic is an indication that this group of people has learned to synthesize raw materials to create new substances. A foundation or remnant of one provides a clue to the former presence of a building. Bricks and wood provide clues to building material. Wood cut in smooth planks indicates the use of power tools.

General conclusions about the culture of the people and their relationship to the land can be hypothesized from the vacant lot as well. For example, the presence of used cans and bottles could indicate that recycling materials was not important to this culture. Printed materials such as newspapers or food wrappers also can provide important clues. Newspapers obviously are full of information which might indicate the relationship of people to their environment and food wrappers reveal information about food processing which reflects the technology of the culture as well.

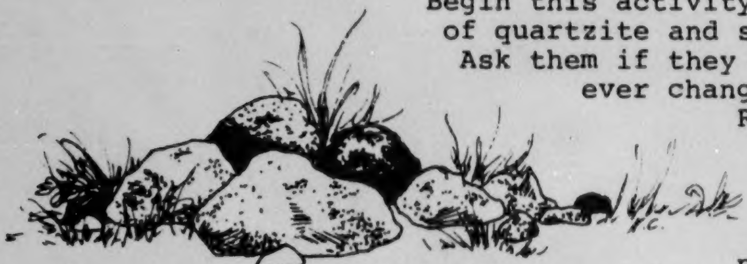
Looking Back. Copyright 1982, Schlitz Audubon Center.

ROCKS TO BUILDINGS

OBJECTIVE: Students will become more aware of the origin of structural materials in the built environment.

MATERIALS: Activity sheet provided. Make a transparency - "The Rock Cycle". Will need samples of sand, sandstone, quartzite, and granite.
Optional: Magnifying glasses

TIME: 1½ hours



Begin this activity by passing around samples of quartzite and sandstone to your students. Ask them if they believe rocks like these ever change their form in nature. Rocks seem virtually indestructible and your students may not be aware that the forces of weathering, heat, and pressure can change rocks. Place a handful of sand, the sandstone, and the quartzite in front of the class and ask if anyone knows how the three are related. Help them to see that the three are related. Help them to see that the sand particles cemented together form sandstone- a sedimentary rock- and that the sandstone, when exposed to pressure forms quartzite- a metamorphic rock.

To further extend the concept of the rock cycle, use the transparency provided to discuss the process of change in rock forms over time. Introduce granite as an igneous rock which was once hot and fluid and which cooled slowly within the earth. When granite is exposed to the forces of weathering it will form minerals such as quartz which weather to form sand.

Using the activity sheet provided, take your class out to examine building materials in the immediate environment around your school. If you have hand lenses available, your students will enjoy taking a close look at rocks in buildings. Some of the sedimentary rocks which your students may find in building materials include conglomerates, sandstone, and limestone. Slate and marble are examples of metamorphic rocks they may find in buildings as well. Encourage them to notice other materials used in construction. Some of the various building materials and their sources are listed:

MATERIAL	SOURCE
steel	iron extracted from earth
wood	trees
glass	quartz sand
cement	limestone and clay (sedimentary rocks)

concrete	sand, cement, and gravel (sedimentary rocks)
bricks	clay
marble	metamorphosed limestone
slate	metamorphosed shale
granite	igneous rock

Students should conclude the activity by realizing that building materials all come from the earth.

Extensions....

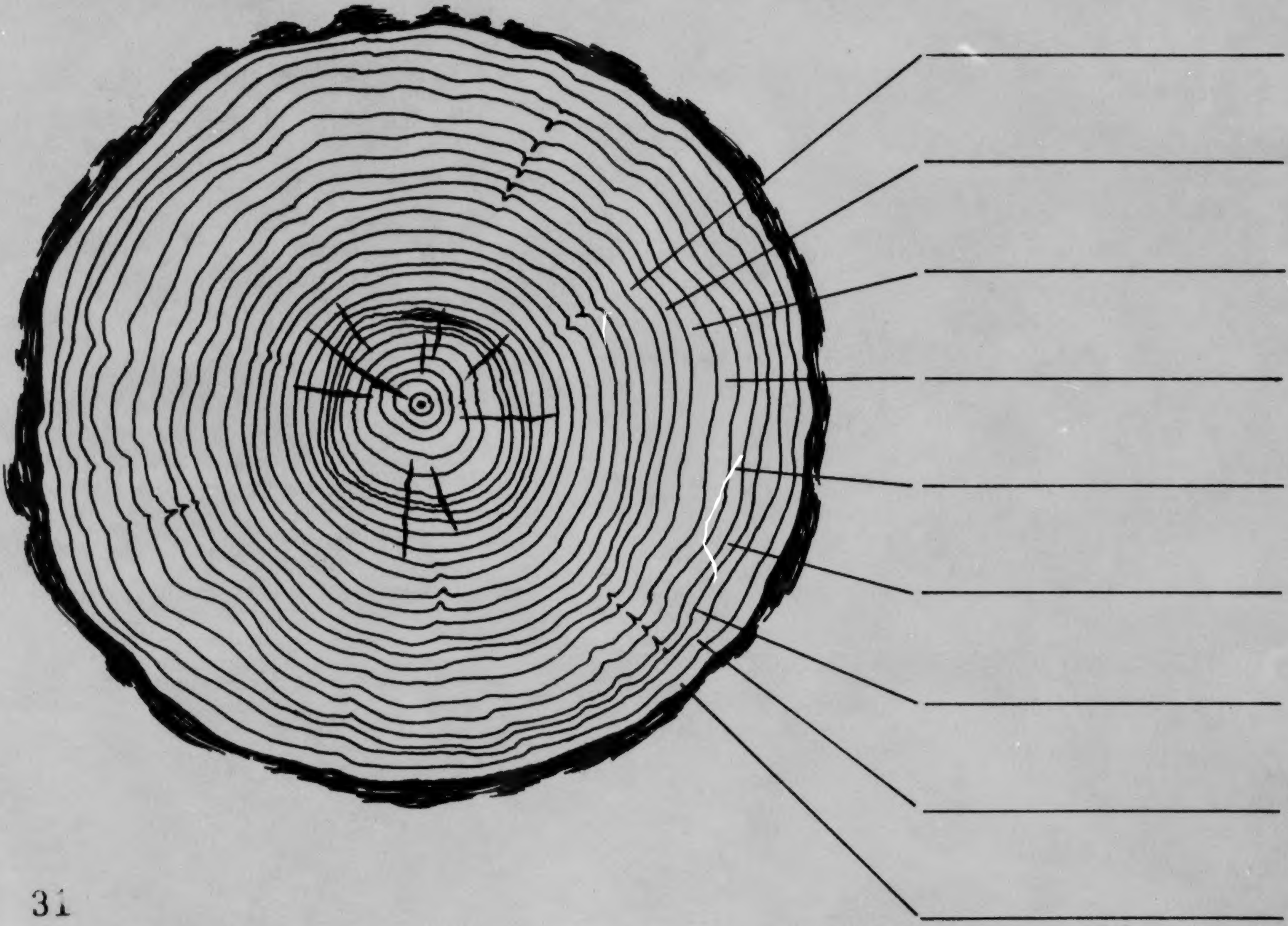
Have a "Salute to Seniors Day." Invite students' grandparents, retired teachers, and elderly "environmental activists" to come to your class. Students could share their "Looking Back" display and the seniors could relate aspects of their past and/or present life-styles which led to conservation of resources.

Students could plant trees around the school and try to imagine what future events might correspond with the annual rings of the trees as they grow.

Take a trip to a rock quarry to allow students to find their own samples of various kinds of rocks from the earth.

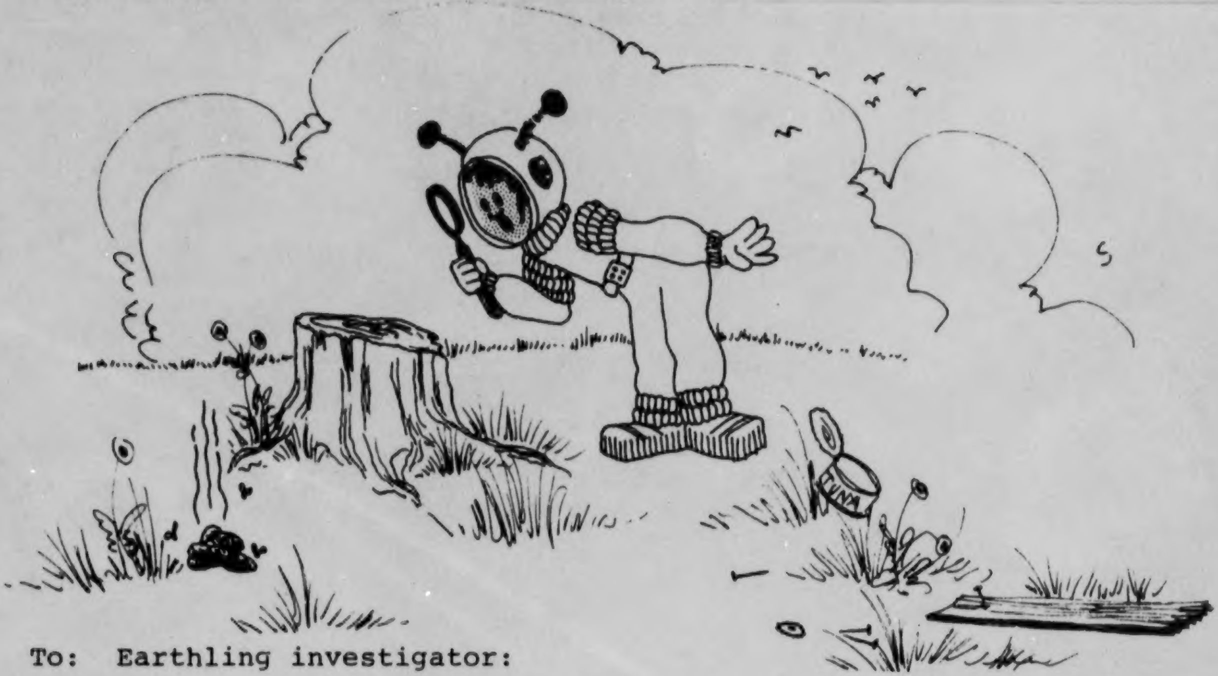
Students could research how the environment affected the pioneer lifestyle, especially in the design of dwellings (wood, stone, sod, etc.) They could also build a model of a pioneer community for a specific region of the United States after researching the availability of various resources there.

TREE HISTORY • SIGNIFICANT EVENTS



Looking Back. Copyright 1982, Schlitz Audubon Center.

VACANT LOT ARCHAEOLOGY



To: Earthling investigator:

You have just arrived on a planet at the edge of our galaxy. Your mission is to determine if there was life on the planet and to find out all you can about the beings who lived there.

Do you think people (or beings like us) once lived on this planet? How do you know?

How far advanced was their culture? Did they have machines? How would you know?

Can you tell what kind of shelters they had? What clues can you find? What do you think their homes were made of?

Looking Back. Copyright 1982, Schlitz Audubon Center.

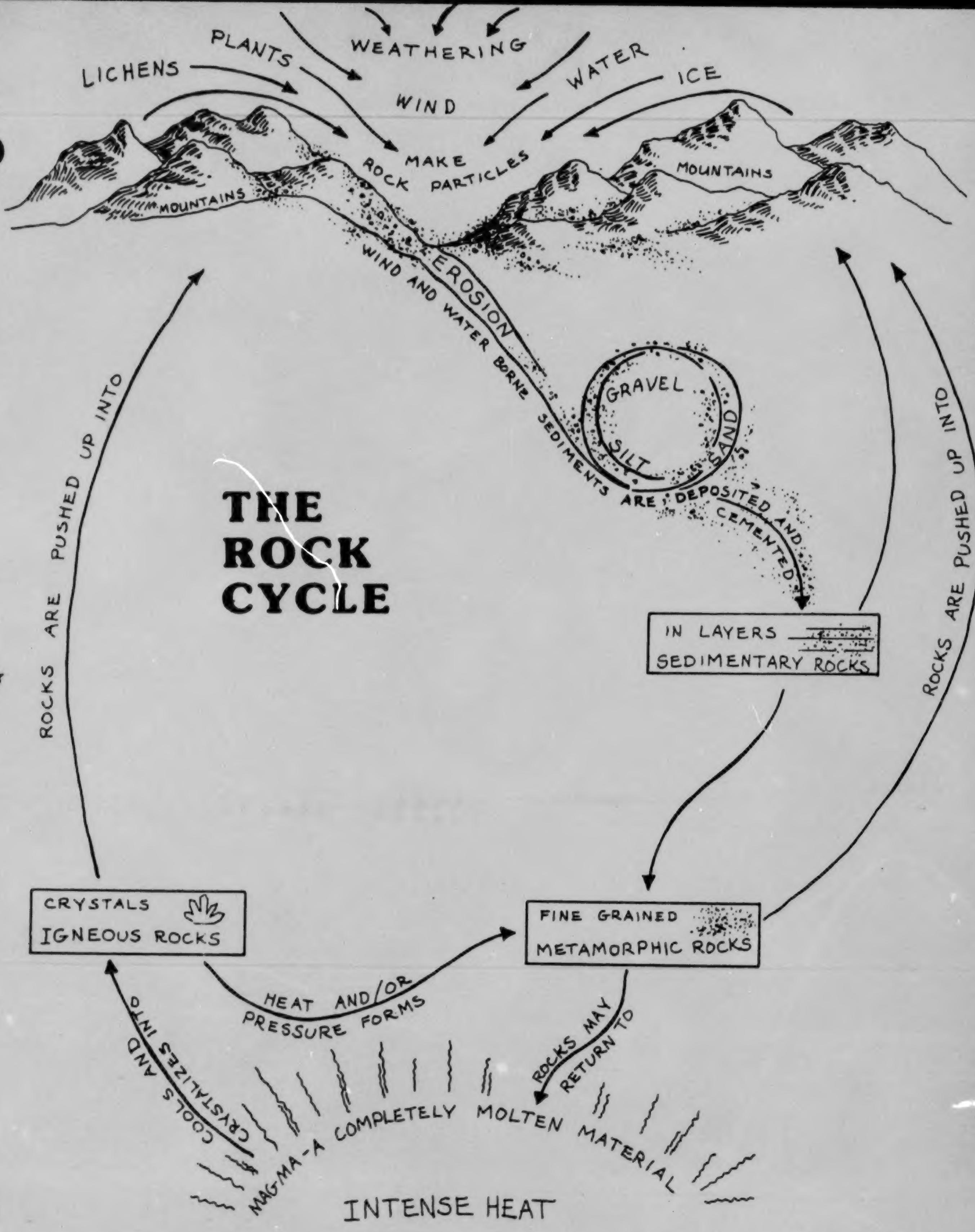
What other creatures live on this planet? Can you find clues to any animals? What clues can you find?

Do you think the people on this planet care about their land? Why or why not?

If visitors from another planet came to visit Earth what do you think they would say about the way we feel about our land?

Write a paragraph describing what you imagine a typical day in the life of a being on this planet would have been like.

THE ROCK CYCLE


WEATHERING
LICHENS
PLANTS
WIND
WATER
ICE
MAKE ROCK PARTICLES
MOUNTAINS
MOUNTAINS
EROSION
WIND AND WATER BORNE SEDIMENTS ARE DEPOSITED AND CEMENTED
GRAVEL
SAND
SILT
IN LAYERS
SEDIMENTARY ROCKS
ROCKS ARE PUSHED UP INTO
ROCKS ARE PUSHED UP INTO
CRYSTALS
IGNEOUS ROCKS
HEAT AND/OR PRESSURE FORMS
FINE GRAINED
METAMORPHIC ROCKS
ROCKS MAY RETURN TO
COOLS AND CRYSTALIZES INTO
MAGMA-A COMPLETELY MOLTEN MATERIAL
INTENSE HEAT

TRANSPARENCY 22

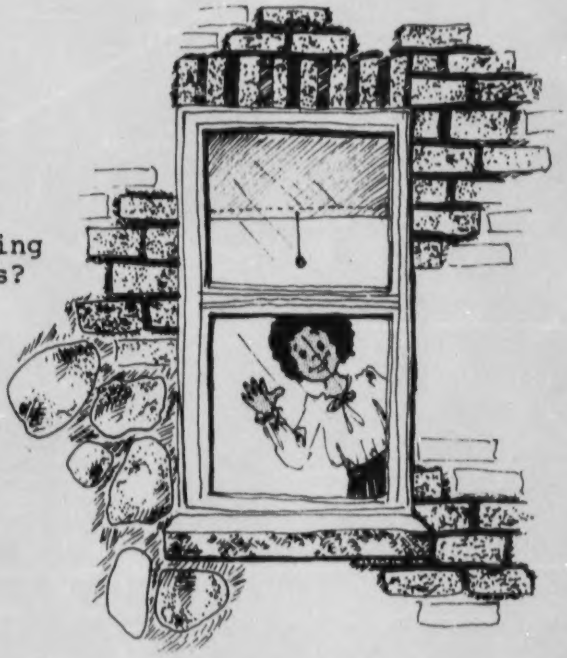
Adapted from: The Rock Cycle, Massachusetts Audubon Society

ROCKS TO BUILDINGS

How many different building materials are on the outside of your school? List them.

Can you find any building material that comes from sedimentary rocks? Can you find any material that comes from metamorphic rocks? What are they?

Are most building foundations in the area made from rocks or from wood? Which material would make a better foundation? Why?



Are there any differences in the building materials used in old and new buildings? How are they different?

Do any of the building materials come from a source other than the Earth?

Looking Back. Copyright 1982, Schlitz Audubon Center.

36

BACK TO BASICS

Activity	Focus	Activity Sheet	Subject Area
What Are We Consuming?	Impact of household products on the environment	x	Social Studies Math Science
Back To Basics?	Examining basic needs		Social Studies Language Arts
Community Workers Web	Interrelationships between community workers and the circular flow of goods and services	x	Social Studies
Wanted: Environmental Helpers	Jobs which contribute to environmental quality	x	Social Studies Language Arts

Back To Basics. Copyright 1982, Schlitz Audubon Center.

BACK TO BASICS

TEACHER INFORMATION

CONCEPTS:

Distinguishing between one's needs and wants.

Clarifying values regarding individual lifestyles and consumer decision-making.

Examining the circular flow of goods and services and the interrelationships among community workers' functions.

Examining products from an environmentalist point of view.

Recognizing occupations which contribute to environmental quality.

WHEAT
USA
EARTH

WHAT ARE WE CONSUMING?

OBJECTIVE: Students will discriminate between products which have the least and most impact on the environment while participating in a group decision-making process.

MATERIALS: Department store catalogs, large sheets of paper, local newspaper want-ads and activity sheet provided.

TIME: Two 1-hour sessions

Back To Basics. Copyright 1982, Schlitz Audubon Center.

Have your class arrange their desks in circles of various sizes. Each circle will represent a family which will be making decisions about designing and furnishing their home. Families could vary from a single parent with two children to an extended family with grandparents. Provide each family with a store catalog, the real estate want-ad section of the newspaper, and a large sheet of paper on which to design a home to meet their needs. Then ask each family to:

have a family meeting to decide what kind of house they are going to need.

decide how big the house will be and determine how it will be heated.

draw a floor plan for their house showing all of the rooms. (This need not be detailed.)

make a list of appliances and furniture needed in the house and list prices from the store catalog.

look in the "want-ads" to find a house similar to one they've designed. List the price of the house. (If the price isn't listed, have a volunteer call the realtor to find out.)

add up the total cost of the house, appliances, furniture, and luxury items. Divide this total by the number in the family and compare with other families.

Initiate a discussion, comparing the homes and furnishing of the various families. Then hand out the "What Are We Consuming?" sheets to each group. Have them rate the products they have chosen. They should first consider if the product requires energy to operate it. Following is a list of some common household appliances and the kilowatts per hour they consume. (From Science and Children, Nov./Dec. 1974, p. 14)

Type of Electric Appliance	Kilowatts per Hour
air conditioner (room)	1.60
clothes dryer	4.90
coffee maker	0.89
dishwasher	1.20
disposal (food)	0.45
electric blanket	0.18
electric iron	1.00
electric range	12.20

40

Type of Electric Appliance	Kilowatts per Hour
fan (furnace)	0.29
food blender	0.39
food mixer	0.13
hair dryer	0.38
radio	0.05

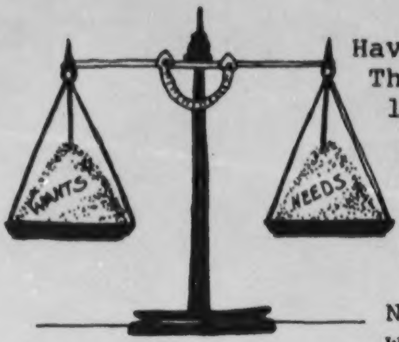
It may be difficult for the students to determine if the product will be useable for a long time. They can look at the warranty offered on the product and make a guess as to how long it will last based on this and their own experience. Then introduce the term "biodegradable." Explain to the class that "bio" means living, and "degrade" means to break down. When they put these meanings together they can see that it means "capable of being broken down by living things." Cite, as an example, leaves which fall to the ground in the autumn. Ask your students what they think might happen to the leaves over time. They must be going somewhere or we'd have leaves piled very high. They should be aware that the leaves are broken down or decayed and become part of the soil. Then have the class look over their list of needs and wants and decide which of these materials are biodegradable. Products made of wood, aluminum, glass, cotton, wool, and materials taken directly from raw materials are biodegradable. Products which are synthesized from raw materials and combined into "new" materials such as plastics, styrofoam, and polyester are not biodegradable. Bacteria, fungus, and small insects have not evolved a means of digesting or decomposing these human-made synthetics!

Finally, ask the students which of the products they actually need and which are merely "wants." Ask them to decide which of the products they would then like to have, based on the above considerations. Find out whether they feel the ecological considerations are important when making decisions.

BACK TO BASICS?

OBJECTIVE: Students will distinguish between their needs and wants and examine how our present lifestyles can become more "basic" or in tune with nature.
MATERIALS: None
TIME: 1 hour

41



Have your class brainstorm a list of needs. Their list will probably include the basics like food, clothing, and shelter. They may also include things like friendship, love, fun, solving problems, learning new things, etc. Discuss which of these things makes them "consumers", noting that consumers use both goods and services.

Note: Distinguish here between needs and wants if the children begin listing things they would like to have other than necessities.

Ask them to imagine that all of our fossil fuels have been depleted and that every product requiring energy is no longer useable. Imagine that the power has been shut off and try to describe how they can meet their basic needs. Have them write a descriptive story depicting a typical day in their lives as they go back to the basics. Have them share their stories with one another. How were their needs met? What were the most basic needs? What "frills" could we cut back on in our present lifestyles and what can we learn from previous eras to help us reach a balance with our environment?

COMMUNITY WORKERS WEB

OBJECTIVE: Students will become more aware of the goods and services provided in a community and the interrelationships between community workers.
MATERIALS: Workers' name tags provided, will need string.
TIME: 45 minutes

Review some of the "goods" which are provided by community workers. Make a list on the board as the students name various workers providing goods such as the grocer, baker, etc. Then have students brainstorm a list of "services" provided for in the community and the community workers who perform these tasks, i.e. firefighters, garbage collectors, police officers, etc. You may also want to include cultural "services" provided by writers, artists, and people in theatrical professions.

Use the attached community workers cards for this activity. Divide your class into two groups and distribute duplicates of the 12 community worker "name tags" to the students. You will notice that both males and females have been depicted in a variety of community worker roles to avoid sex role stereotyping. Have each group of students sit

Back To Basics. Copyright 1982, Schlitz Audubon Center.

in a circle and randomly distribute the name tags. Tell them that the city budget director has just cut the city budget and that 2 community jobs will have to be cut. The students must decide which positions will be cut and why. Each community worker must defend his/her position in the community.

Through this activity students should become aware of the interrelationships of community workers and the circular flow of goods and services. They should also become aware of the necessity of the various community worker functions. Compare this human community worker's web to a community in nature. Just as various members in the human community work together to function as a whole, a natural community has producers, consumers, and decomposers. (See the "Vacant Lot Food Web" activity in the Natural Neighbors packet to extend this concept.

WANTED: ENVIRONMENTAL HELPERS

OBJECTIVE: Students will become familiar with jobs that contribute to environmental quality.
MATERIALS: Activity sheet provided and some want-ad newspaper sections.
TIME: 1 hour

Distribute the "Wanted: Environmental Helpers" sheet to your students along with sections of newspaper want-ads. Go over the lay-out of the want-ads with your students. Then initiate a discussion about jobs which might contribute to a healthy environment. Make this the focal point of the activity. Some of the more obvious "environmental helper" jobs are foresters, naturalists, game wardens, etc. Other jobs may contribute to a healthy environment as well. For instance, bus drivers could be viewed as environmental helpers since they contribute to mass transportation which saves fuel. Garbage collectors also clean up the environment as do sewage treatment plant workers. Teachers and writers who inform others about environmental concerns are also environmental helpers. After the children have completed the activity sheets discuss their responses with the class. They could pass around the want-ads they have written and have the class decide which jobs are most useful and/or appealing.

Extensions

Students could interview an "environmental helper." Contact someone from the community to come in and explain aspects of their work. Have students decide which kind of environmental helper they would like to interview and draft a letter requesting someone to come to your school.

Have students choose an environmental helper career. Taking turns, have a student go before the class and play "What's My Line?" Using questions which could be answered with a "yes" or "no", classmates can try to identify the career of the student.

Students could examine objects in the school environment and rate them on their energy efficiency and durability.

WHAT ARE WE CONSUMING?

Product to be purchased	Does it use energy (elec. or gas)?			Will it be useable for a long time?		Is it biodegradable? (Can nature decompose it?)		Do I really Need it or Want it		Total Score:
	none 1	little 2	lots 3	yes 1	no 2	yes 1	no 2	need 1	want 2	

Rate each product by adding up the numbers in each column you check.

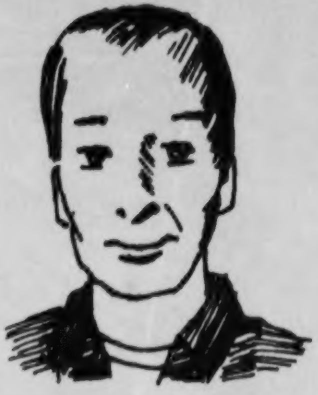
Product Rating:
4-5 Ecology-wise product
6-7 Kind-of-wise product
8-9 Energy guzzler

46

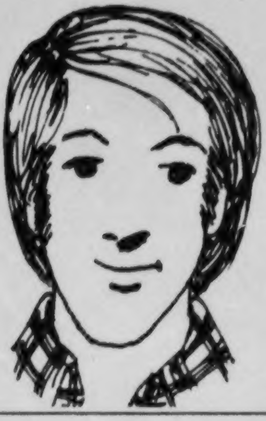
Back To Basics. Copyright 1982, Schlitz Audubon Center.

COMMUNITY WORKER'S WEB

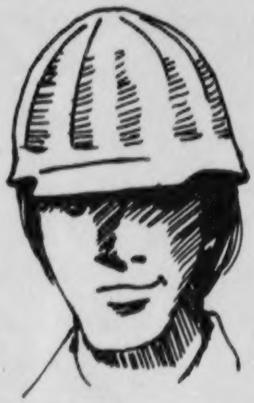
PARK CARETAKER



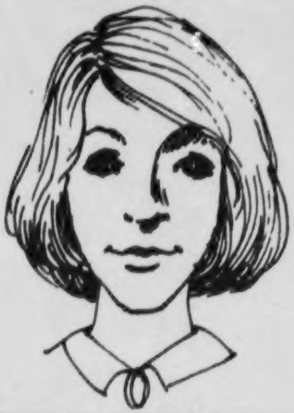
GARBAGE COLLECTOR



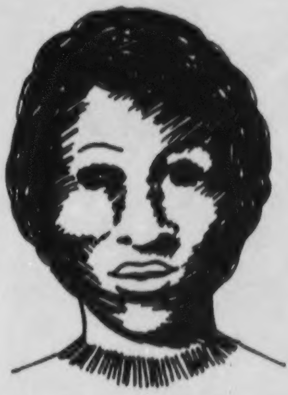
BUILDING CONTRACTOR



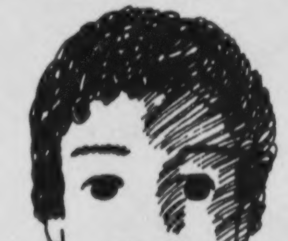
TEACHER



BUS DRIVER



FIRE FIGHTER

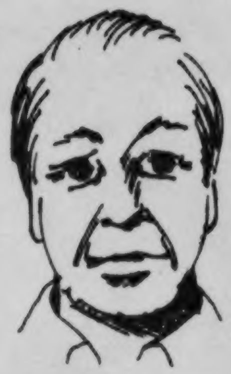


Back To Basics. Copyright 1982, Schlitz Audubon Center.

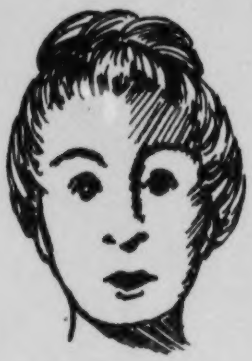
COMMUNITY WORKER'S WEB

CUTTING LINE

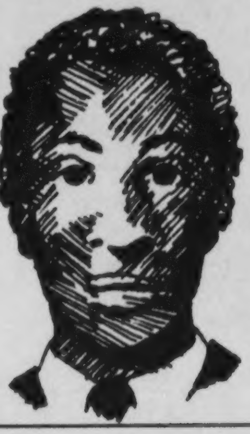
GROCER



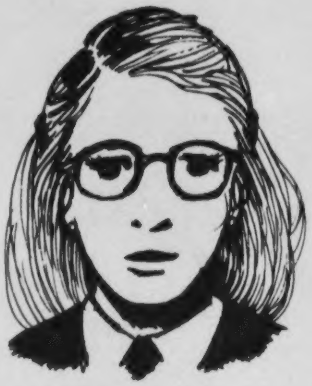
DOCTOR



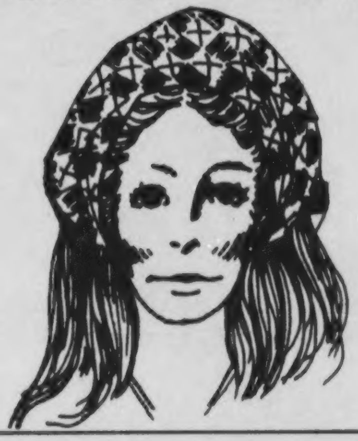
POLITICIAN



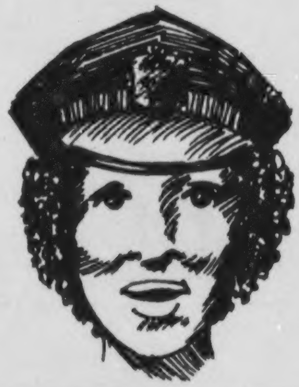
BANKER



TEXTILE WORKER

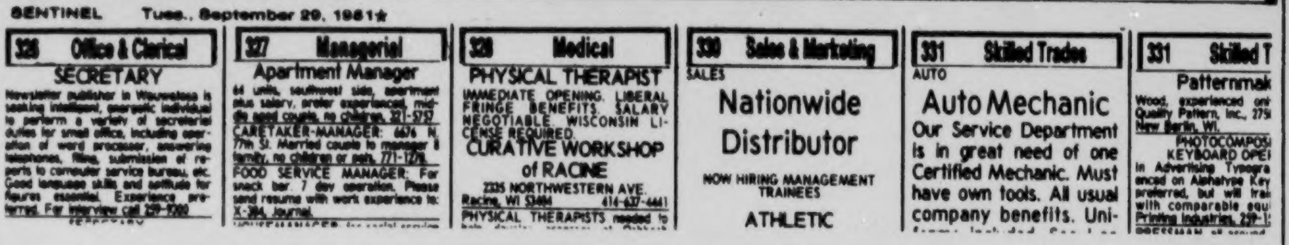


POLICE OFFICER



Back To Basics. Copyright 1982, Schlitz Audubon Center.

Wanted: Environmental Helpers



SENTINEL Tues., September 29, 1981★

326 Office & Clerical

SECRETARY

327 Managerial

Apartment Manager

CARETAKER-MANAGER: 6676 N. 77th St. Married couple to manage 8 family, no children or pets. 771-1276.

FOOD SERVICE MANAGER: For snack bar. 7 day operation. Please send resume with work experience to: X-364, Journal.

328 Medical

PHYSICAL THERAPIST

IMMEDIATE OPENING. LIBERAL FRINGE BENEFITS. SALARY NEGOTIABLE. WISCONSIN LICENSE REQUIRED.

CURATIVE WORKSHOP of RACINE

2335 NORTHWESTERN AVE.
Racine, WI 53404 414-637-4441

PHYSICAL THERAPISTS needed to

330 Sales & Marketing

SALES

Nationwide Distributor

NOW HIRING MANAGEMENT TRAINEES

ATHLETIC

331 Skilled Trades

AUTO

Auto Mechanic

Our Service Department is in great need of one Certified Mechanic. Must have own tools. All usual company benefits. Uni-

331 Skilled T

Patternmak

Wood, experienced on
Quality Pattern, Inc., 275
New Berlin, WI.

PHOTOCOMPOSI
KEYBOARD OPE

In Advertising Typogra
enced on Alphatype Key
preferred, but will tra
with comparable equ
Printing Industries, 259-1

Find a want-ad listing for an environmental helper or a person who helps the environment. What skills are needed for this job? List them.

Does the job provide goods for people or provide a service?

How does the job help the community? How does it help the environment?

Write a "want-ad" for an environmental helper job. Include in your ad the description of the job, skills needed, and salary. Be sure the job you advertise is one which helps nature or helps the environment where you live.

4.)

Back To Basics. Copyright 1982, Schlitz Audubon Center.

GOING PLACES

Activity	Focus	Activity Sheet	Subject Area
Movin' Around My City	Local modes of transportation	x	Social Studies
Makin' Movin' Graphs	Summary of transportation in the city		Math Social Studies
From Canoes, To Cars, To ...	Transportation-Past, Present & Future	x	History Social Studies Science
The Day The Cars Disappeared	Impact of auto on our lives	x	Language Arts Social Studies

Going Places. Copyright 1982, Schlitz Audubon Center.

GOING PLACES

TEACHER INFORMATION

CONCEPTS:

Examining transportation systems as a means of moving goods and people.

Understanding the development of modes of transportation and their source of energy.

Understanding how our transportation systems have an impact on the land, people, and natural resources.

GO THIS WAY
AND THAT WAY
SCHOOL BUS LINES
AND THIS WAY

MOVIN' AROUND MY CITY

OBJECTIVE: Students will become more aware of modes of transportation in their city.
MATERIALS: Activity Sheet provided.
TIME: Take home activity plus ½ hour class time.

Have your students keep track of the modes of transport they observe while traveling to and from school one day to encourage them to think about the ways goods and people are transported in your community. Distribute the tally sheet and present it as a challenge to see who can come up with the longest list of modes of transport. Lists could include walking, jogging, bicycling, driving of cars, buses, trucks, trains, flying, shipping, etc. Have students compare notes and decide which modes of transportation are most common and also which have a negative impact on the environment by polluting the air. Note: The "Movin Out" packet also contains activities on air pollution and the auto.

Going Places. Copyright 1982, Schlitz Audubon Center.

MAKIN' MOVIN' GRAPHS

OBJECTIVE: Students will improve graphing skills while summarizing data collected on transportation of goods and people.
MATERIALS: Two large sheets of paper, construction paper and stapler.
TIME: Two 1 hour sessions

Referring to the Movin' Around Survey in the previous activity, have students list all the modes of transport observed for people and another list for modes of transport for goods. Have them combine their information to get class totals. Using large sheets of paper have them make a movin' bar graph for people and one for goods. Use construction paper to make the bars for the graphs and staple them in place. Half the class could work on each graph. Divide tasks of cutting, measuring, labeling, etc. among groups of students.

Discuss the combined results of their observations. Help them realize that the graphs only indicate transportation trends in your city. They should be aware of biases in their survey as a result of such factors as the length and location of the route they take to school as they collect their information. Encourage them to realize that observations from airports, harbors, or train stations would produce different results.

FROM CANOES, TO CARS, TO.....

OBJECTIVE: Students will become more aware of the growth of transportation needs over time and will make predictions about our transportation future.
MATERIALS: Student Activity Sheet provided
TIME: Two 1 hour sessions

Going Places. Copyright 1982, Schlitz Audubon Center.

An historical perspective can give students an insight into how transportation needs have grown over the years and the resulting impact on the environment. Have your class investigate the history of the development of transportation in your area. Is your city situated near a major river or coast? Discuss the importance of water as a transportation route in the past from the canoes of earlier civilizations to the more modern steamboats. Then allow for some library research time to enable students to learn more about past transportation for your area. Old pictures and drawings of people and goods being transported could promote some interesting discussions.

Introduce the term "fossil fuel" and initiate a discussion about renewable vs. non-renewable energy sources. How has our reliance upon non-renewable fossil fuels affected our environment? (mining, drilling, air pollution, acid rain, development of highway systems, etc.)

Distribute the student activity sheet to your class. Have them attempt to match the transportation events with the dates and then make future predictions about upcoming transportation events. Review past events and then initiate a discussion about future trends. How much can we rely on our fossil fuels? Where will we go from here?

THE DAY THE CARS DISAPPEARED

OBJECTIVE:	Students will realize the impact of the automobile on our lives as they describe life without the auto.
MATERIALS:	Activity Sheet provided.
TIME:	1 hour

Cars have a profound effect on our lives in the city. Have your class brainstorm a list of all the things the car brings to the city. They should be able to come up with quite a list, including gas stations, freeways, traffic signs, billboards, parking lots, noise pollution, parking meters, etc.

Distribute the activity sheets and ask your students to think about a life without cars. How many different ways would we be affected? As a creative writing exercise ask your class to write a short story about the day the cars disappeared. Have them share their stories with each other and discuss the negative and positive aspects of the auto in our lives.

Extensions

Ask a traffic engineer to come in and speak to your class about problems encountered on the job and future plans for transportation in your city.

Make a timeline to illustrate the amount of time elapsed between development of the wheel, steam engine, railroad, auto, etc. You could go back in time to record travel by horse, canoe, or stagecoach. The timeline can be simply drawn on the board, or use string with markers stapled around it. Decide on a scale such as 10 years equals 1 inch.

Students could examine the number of calories one uses in various activities such as walking, running, bicycle riding, sitting (as in a passenger). Explain the way food calories are our source of energy.

Have students conduct a cross-cultural comparison of transportation in our country with modes of transport in a less developed country. How are we different? What recommendations would students make to the less developed country?

For additional information: National Geographic, Energy- A Special Report in the public interest. February, 1981.

Going Places. Copyright 1982, Schlitz Audubon Center.

MOVIN' AROUND MY CITY SURVEY

On your way to and from school one day keep a "movin" record of the number of people and goods you see being transported.

Who or what is being moved?	How are the people or goods moving?	# of times seen moving this way...	Does the move use gas? YES	 NO
Example: furniture	truck	1	X	

56

Going Places. Copyright 1982, Schlitz Audubon Center.

FROM CANOES, TO CARS, TO....

People didn't always have cars to drive or jets to fly around in. Our transportation systems have changed a lot over time. Take a close look at the events and dates below and then try to make some predictions of your own.

YEAR	EVENT
1018	The wheel is invented
1776	Steam engine developed by James Watt
1859	First oil well is drilled
1860	First internal combustion engine
1869	Transcontinental railroad is completed in the U.S.
1913	Ford assembly line produces cars for millions of people
1927	Charles Lindberg flies non-stop across the Atlantic
1942	First American jet plane flown in U.S.
1950	Oil takes the place of coal as major U.S. energy source
1969	First person lands on our Moon
1970	Oil production peaks in U.S. (its non-renewable!)
1974	Oil prices skyrocket causing gas shortages at U.S. gas stations
	Where will we go from here?

Make your own predictions for transportation events which might occur in the future:

Year	EVENT
1999	
2010	
2059	
3000	
?	

How many years went by from the drilling of the first oil well to the gas shortages in the U S.?

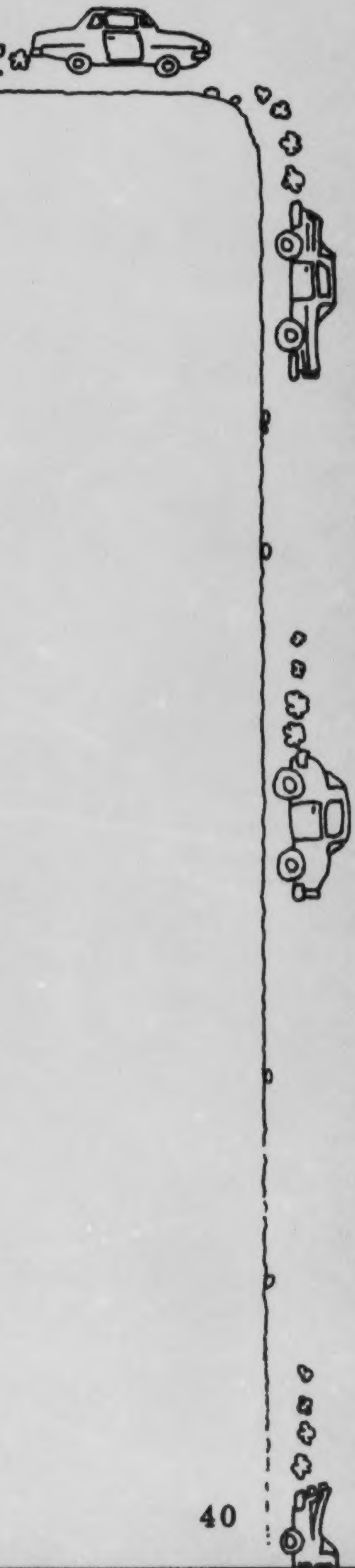
Going Places. Copyright 1982, Schlitz Audubon Center.

The wheel was invented in 1018. How many years later did the first person land on the moon?

Which forms of transportation do not require energy from fossil fuels?

What does non-renewable mean?

THE DAY THE CARS DISAPPEARED........



Going Places. Copyright 1982, Schlitz Audubon Center.

WATER, WATER EVERYWHERE

Activity	Focus	Activity Sheet	Subject Area
Water Cycles	Water cycle in nature and in the city	Transparencies needed	Science Social Studies
Where Does the Water Go?	Water treatment		Science Social Studies Art
My Water Record	Individual water consumption	x	Science Social Studies
Water Figures	Water consumption and conservation	x	Math Social Studies Science

Water, Water Everywhere. Copyright 1982, Schlitz Audubon Center.

WATER, WATER EVERYWHERE

TEACHER INFORMATION

CONCEPTS:

Understanding how water cycles in nature.

Realizing the importance of water in our daily lives.

Understanding the cycle of water consumption and treatment in the urban environment.

Examining means of water conservation on an individual level.

WATER CYCLES

OBJECTIVE:	Students will become familiar with the water cycle and the cyclic process of water consumption and treatment in the city.
MATERIALS:	Two water cycle transparencies needed
TIME:	1 hour

Write the following statement on the board to begin this activity: "The water we use today is the same water the ancient Egyptians used thousands of years ago." Ask your students if the statement is true or false. Undoubtedly, the idea will be a new one to them.

Using the transparency of the water cycle provided, explain this cyclic process to your class. Explain that falling rain is one part of the cycle. The rainwater comes from water which is evaporated from the land and water. Water is heated by the sun, rises to higher altitudes, cools sufficiently to condense into clouds and finally falls back to the earth as precipitation. The precipitation which falls on the land is taken up by vegetation and also percolates down through the soil. This ground water flows into rivers, streams, and lakes and is then exposed to the sun to be evaporated once again. Water is also given off from the vegetation through the process of transpiration. The evaporated water cools as it rises until it condenses into clouds, completing the cycle.

Water, Water Everywhere. Copyright 1982, Schlitz Audubon Center.

Help your students to see that the water cycle is a closed system It goes around and around with the same water we have always had. Emphasize that we will never have more water on Earth than we have now and thus the importance of protecting this precious resource.

The second transparency is a simplified illustration of the water cycle in the urban environment. Your students may not be aware of the cyclic process of their water useage in the city. Ask your students how the water cycle in nature might be altered in the urban environment. For example, what happens to the rain that falls onto the school blacktop and city streets? Since the water can't percolate down through the concrete, where does it go? You may want to take advantage of the next rainstorm as an opportunity to observe the water cycle in action. Go out during or after the rain and watch how the water runs off the playground, sidewalks, and streets into the storm sewers. Look at the puddles that have formed and discuss the process of evaporation. (See the Mini-rivers activity in the Water We Losing unit.)

WHERE DOES THE WATER GO?

OBJECTIVE: Students will become aware of the source and treatment of their local water supply and share their knowledge with others in the school.
MATERIALS: Large paper for mural, paints, brushes, and resource material on water treatment in your city
TIME: Two 1 hour sessions plus optional field trip

Ultimately, students should realize that their water comes from rain. They should also realize that waste water does not just go down the drain and disappear. If you can schedule a trip to your local water treatment plant, this will help to reinforce this idea. If such a trip isn't possible, contact your city water department for resource materials, information, and/or a speaker to come to your class.

Ask your school maintenance person to take your class into the basement of the building and show your students the water pipes coming into and going out of the building. Ask him or her about water consumption for the school.

When your students have gathered sufficient information about the source and treatment of your local water supply have them make a class mural of water flow in and out of your school building. The mural should depict the source of water in your area, the process it goes through before entering your school and its outflow to the waste treatment plant. Have the class decide on a location in your school building to hang the mural. They might want to place it over the drinking fountains or near bathrooms to raise the awareness of others in the school.

MY WATER RECORD

OBJECTIVE: Students will calculate the amount of water they use in a typical day.
MATERIALS: Activity sheet provided, 8 ounce paper cups
TIME: 1 hour class time following 1 day of students' outside time

Hold up a one gallon container filled with water and ask your students to guess how many gallons of water they each use in one day. Tell them to write their guesses down and then collect them. Tell them they will have a chance to figure out their water consumption. Distribute an 8 ounce paper cup and a water record sheet to each student. Ask them to begin the following morning to keep track of every time they use the paper cup at home, school etc. They should use the paper cups during the day when drinking water to keep track of the amount they consume. Figures are provided for some of the common household uses of water. For water uses involving other members of the family such as clothes washing, they could divide the total gallons by the number of people in the family to report their share. Remind your students that they are trying to find out their water consumption for a typical day, not a record-breaking consumptive or conserving day.

When their records are complete have each student add up his/her water consumption for the day. Then hand out their initial guesses for them to compare. Students could then add their totals to get a class total and compute a class average. Have them determine which uses consume the most and least water.

WATER FIGURES

OBJECTIVE: Students will state the importance of water in their daily lives while improving skills learned in math.
MATERIALS: Activity sheet provided
TIME: 1 hour

Once your students have had a chance to examine the many different ways they use water, distribute the Water Figures activity sheet. When they have completed the computations encourage a discussion about water consumption. Discuss ways that water could be conserved, particularly hot water which requires energy to heat it.

Extensions

Have the class research annual rainfall amounts for the last 100 years in your town to see what effects drought has had on the local economy and lifestyles of individuals. Copies of news articles in years of drought may be useful to highlight the impact of drought on the population.

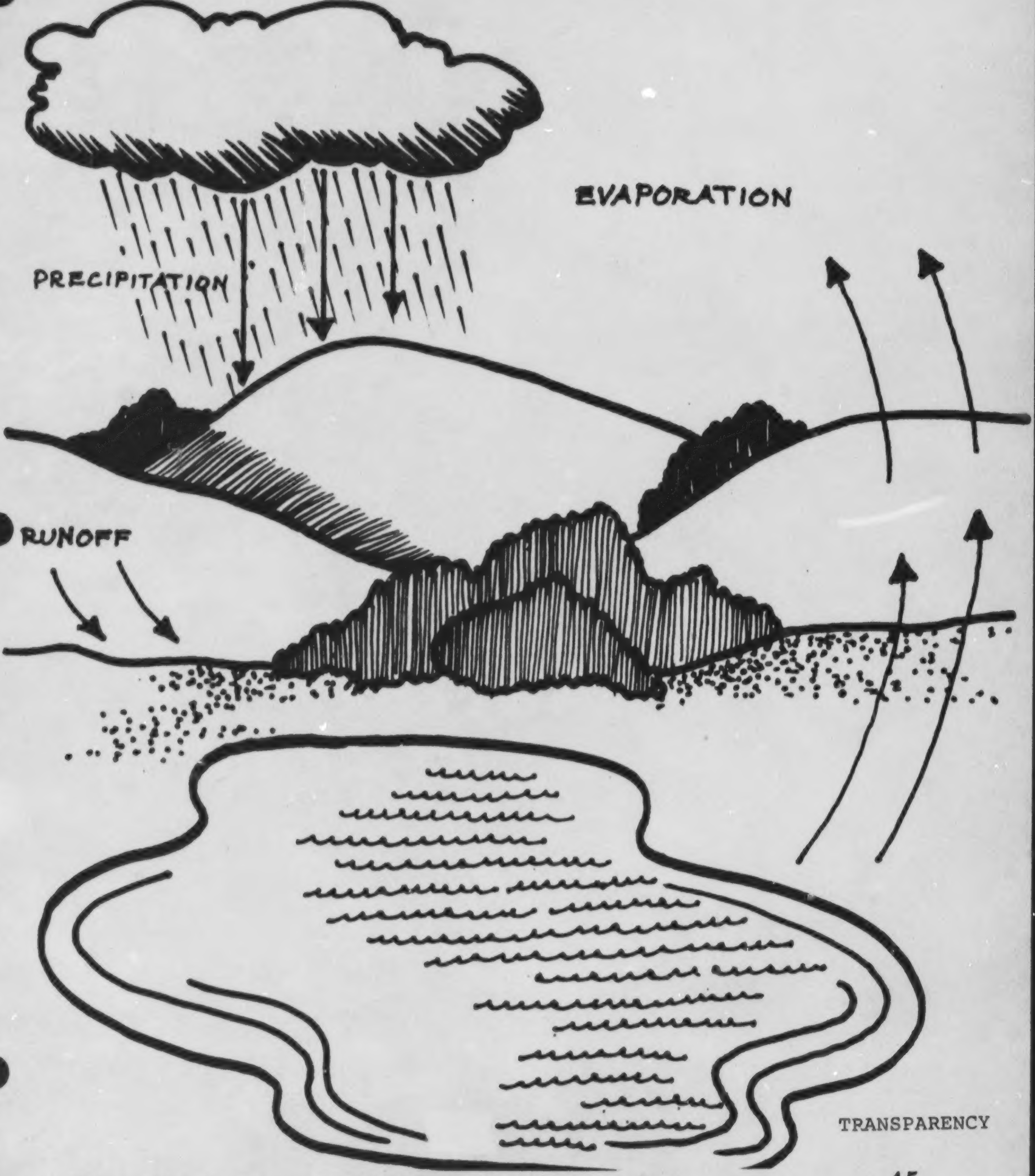
Your students might want to try keeping a record of their water consumption on a day when they are trying to conserve water to compare with their previous water record.

Creative writing could center around imaginary situations such as the year we had no rain or the winter the snow wouldn't stop falling.

Using creative dramatics to illustrate the water cycle might provide an enjoyable means of reinforcing this concept. Have students act out the flow of water. Some could be clouds, others streams, lakes, and ground water. Then other students could move around them as arrows labeled precipitation, run-off and evaporation.

Water, Water Everywhere. Copyright 1982, Schlitz Audubon Center.

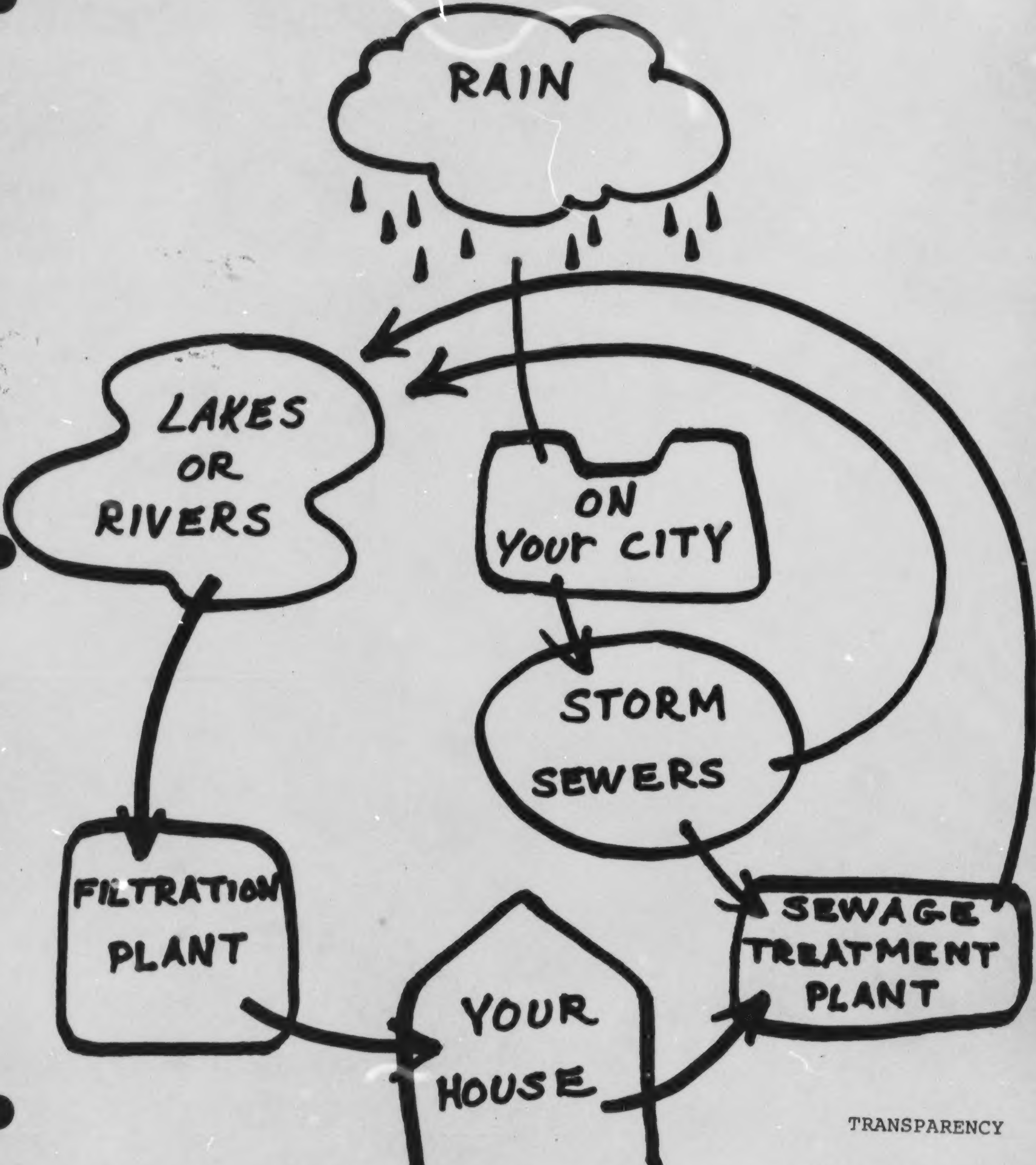
WATER CYCLE


EVAPORATION
PRECIPITATION
RUNOFF

TRANSPARENCY

Water, Water Everywhere. Copyright 1982, Schlitz Audubon Center.

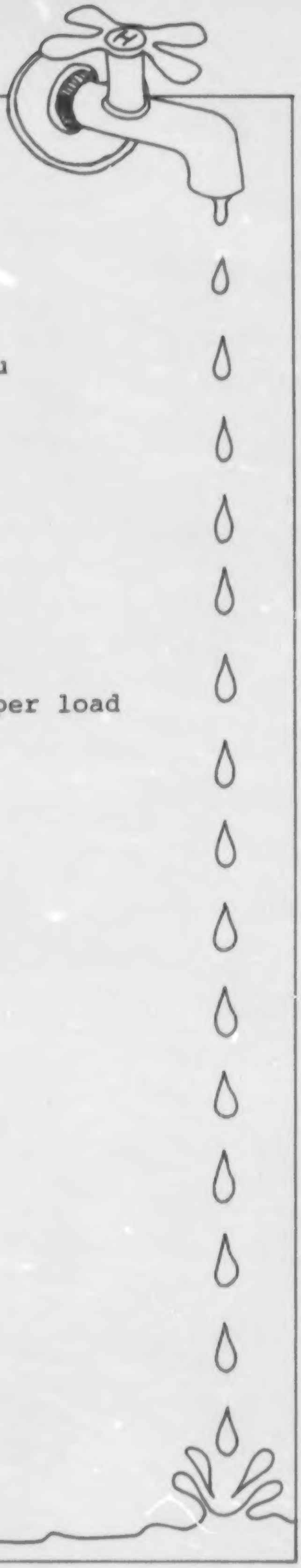
Water Cycle In The City


RAIN
LAKES OR RIVERS
ON Your CITY
STORM SEWERS
FILTRATION PLANT
YOUR HOUSE
SEWAGE TREATMENT PLANT

TRANSPARENCY

Water, Water Everywhere. Copyright 1982, Schlitz Audubon Center.

MY WATER RECORD



Here are some examples of how much water we use around our homes. Use these figures to help you keep track of your water use.

Showers use 5 to 15 gallons per minute
Taking a bath uses 25 to 30 gallons
Flushing the toilet uses 5 to 7 gallons
A bathroom faucet left running can use 2 to 5 gallons per minute
A dishwasher uses 15 gallons per load.
A clothes washer uses 25 to 30 gallons per load

MORNING:

AFTERNOON:

EVENING:

Water, Water Everywhere. Copyright 1982, Schlitz Audubon Center.

WATER FIGURES

In the United States the average family uses 70 gallons of water a day for each member of the family. Is this more or less than the amount of water you use?

Figure it out ...

How many gallons of water do you use in a day? ________ How much water would that be in 1 week? In 1 month? In 1 year?

How many gallons of water would your whole family use in 1 year if each person used the same amount of water as you?

Bonus question:
How many liters would they use in 1 year?
1 gallon = approximately 4 liters.

If a bathroom faucet left running used 3 gallons per minute, how many gallons would you lose if it was left running for 5 minutes?

Water, Water Everywhere. Copyright 1982, Schlitz Audubon Center.

NATURAL NEIGHBORS

Activity	Focus	Activity Sheet	Subject Area
Adjectives Hunt	Sensory appreciation and descriptive writing	x	Language Arts Science Art
Green Neighbors	Role of plants as producers and plants in urban environment	Transparency needed	Science
Ant Antics	Ant behavior	x	Science Math
Vacant Lot Food Web	Interrelationships in nature	x	Science Social Studies
Hidden Worms	Adaptations		Science
Invent A City Critter	Adaptations		Science Art Language Arts

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

NATURAL NEIGHBORS

TEACHER INFORMATION

CONCEPTS:

Plants and animals perform various functions in their communities, similar to functions performed by people working in a neighborhood.

Interrelationships between plants and animals create a food web.

Plants and animals in the urban environment are specially adapted to their environment.

An important part of the urban environment is the natural community. Youth in our central cities often lack contact with the natural environment. Their world of asphalt and concrete provides them with indirect experiences with the natural components of their daily needs. Food comes from the supermarket, water from the faucet, and heat from the furnace. Experiences with nature are too often limited to recognizing small inhabitants of the vacant lot or the pigeons roosting on the adjoining neighbor's roof. But even the "natural" vacant lot has become a place to dump trash or play ball and rarely are the children cognizant of their own direct dependence upon the land as a life-sustaining force.

ADJECTIVES HUNT

OBJECTIVE:	Students will improve descriptive writing skills while concentrating on sensory appreciation of their environment.
MATERIALS:	Adjective cards provided
TIME:	1 hour

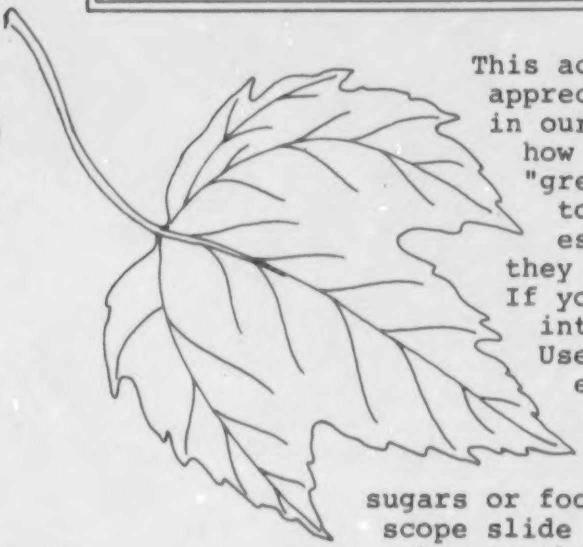
Divide up the twelve adjective cards among your students. Ask them if they can find natural objects in the immediate outside environment to fit the adjectives and then go out on an adjective hunt. Students should be advised not to harm living things. They can list objects that fit each adjective and collect rocks, sticks, fallen leaves, or litter that match their adjectives.

Assemble the students and categorize their findings according to natural and human-made objects. Which adjectives describe more natural objects and which describe more human-made objects?

When you return to the classroom have each student decide on a plant or animal they would like to impersonate. Have them write a descriptive paragraph using as many adjectives as they can to describe the plant or animal they choose. They should then read off their adjectives and see if other students can guess who they are.

GREEN NEIGHBORS

OBJECTIVE: Students will become more familiar with the process of photosynthesis and with plants in the urban urban environment.
MATERIALS: Transparency needed, microscope
TIME: 1 hour

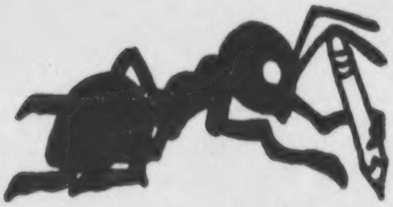


This activity is designed to help students appreciate the vital role that plants play in our lives. Ask your students to describe how we might be able to live without our "green neighbors." They will soon come to the realization that plants are essential to our survival in the role they play as producers of food and oxygen. If your students are unfamiliar with it, introduce the process of photosynthesis. Use the transparency suggested to explain this life-sustaining process. Help them to appreciate the "wonder" of plants being capable of converting water and carbon dioxide to simple sugars or food. Mount a leaf specimen on a microscope slide and set it up for your students to observe the chlorophyll and the stomata where oxygen is released from the leaf.

Take your class outside to take a closer look at their "green neighbors." Examine the varieties of plants in the environment and discuss the basic needs of plants to survive. How do we help or hinder those needs by our actions in the urban environment? For instance, are there trees trying to grow in the cramped quarters between the curb and the sidewalk? Are these places where the grasses are worn away by human feet? Are there examples of wounds in the bark of trees or places where branches are torn down? Is this any way to treat our green neighbors who provide us with oxygen, shade, and beauty in the urban environment?

ANT ANTICS

OBJECTIVE:	Students will become more familiar with the behavior of ants.
MATERIALS:	Activity sheet provided, stopwatch, ruler, writing surfaces, and small amount of cheese, bread, and honey.
TIME:	1 hour



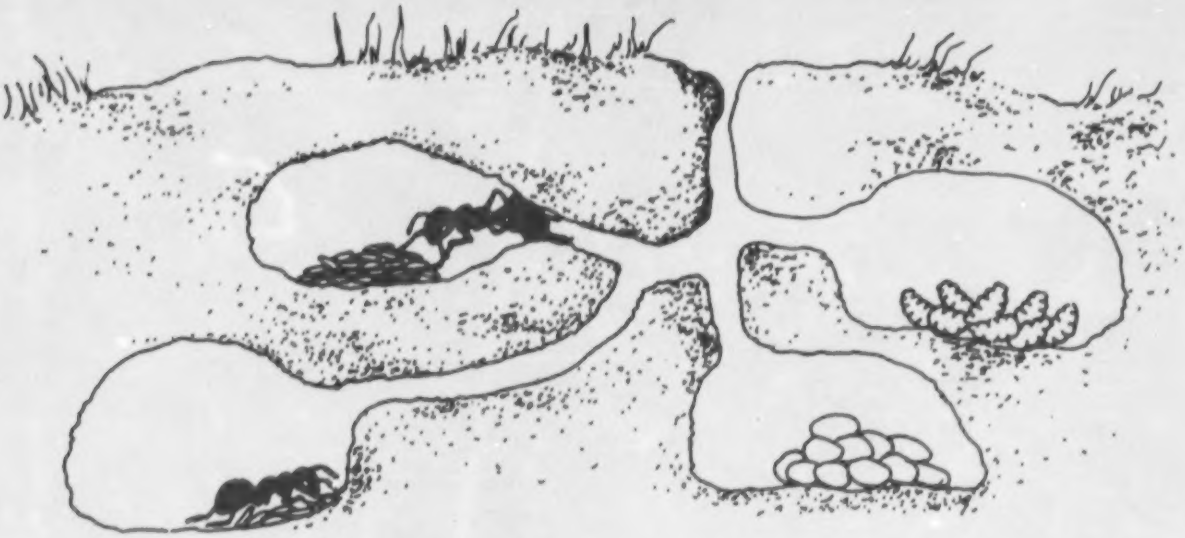
Before taking your students out for this activity, you may want to locate some ant hills in the area around your school. Do this the day before you plan to take your class out and then place a small dish of honey or sugar water out near the ant hill. Then when your students go out to investigate, they can observe the ants' trails to the food. Ants are fascinating creatures. They are social insects living cooperatively in colonies. Studying their interactions may help students to see the similarities between social insect colonies and cooperative communities of people. Following is some background information to assist you in arousing your students' interest about this familiar urban neighbor.

Colony: The ant colony is composed of a queen, female workers, a few winged male drones, and winged females. The queen and the winged ants are the royalty of the colony. They are tended by the workers who forage for food and care for the eggs the queen lays. A colony begins when the male and female winged ants take to the air. On this swarming day, they mate, males die, and the new queens go off to begin a new colony. The new queen bites off her wings, seeks shelter underground, and never goes above ground again.

She then begins laying eggs for a new colony. Ants have 4 stages of development - egg, larva, pupa, and adult. The worker ants move the queen's eggs to "nursery" areas in the colony. They will also move the eggs near the surface of the ground when days are warm. During cool nights the eggs are brought down to deeper, warmer rooms. The workers feed the larvae when the eggs hatch. In the pupal stage the ants don't feed. The young ants are carefully protected by the worker ants. The worker ants will risk their lives to save them.

74

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.



Body Parts of the Ant: The ant's head has a small brain and compound eyes. The jaws or mandibles are powerful and are used to cut up food and carry nest materials. The antennae of the ant is used for communication with other ants and to taste and feel different objects. If the ant loses its antennae, it soon dies. When the ant finds food, it leaves a chemical odor trail back to the nest so others can find it. Each ant colony has its own distinct odor which keeps other ants from confusing trails. When ants are moving along, tapping their antennae like a cane, they are following odor trails.

Thorax: The chest section of the ant has a small heart and salivary glands for food digestion. The 6 legs are connected here. They have no veins, their colorless blood being pumped freely through their hollow body sections.

Abdomen: The ant has two stomachs, the larger being the crop where food is stored for the benefit of other ants. Food needed by the ant is pumped out of the crop to the second stomach where it is digested. When workers return with crops full of food, they pump some from their crop for young ants and the queen. Not having lungs, they breath through special holes in the sides of their abdomens.

When you take your class outside, have them work in groups to observe ant behavior around the colonies. If you've only located one colony, have some students observing while others look for additional colonies. Help your students to appreciate the functioning of the colony as a whole and compare this to the cooperative interactions which occur among communities of people.

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

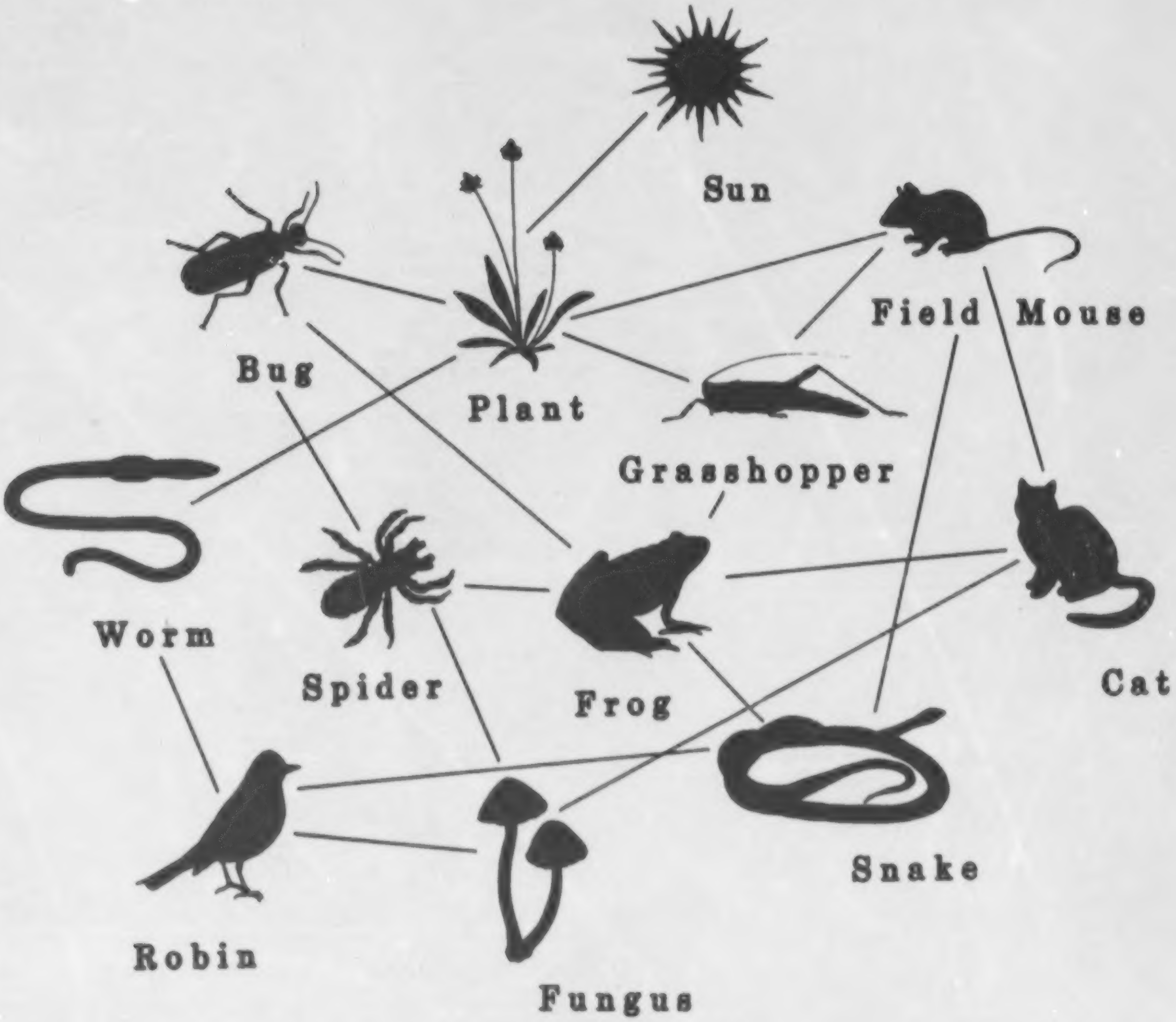
VACANT LOT FOOD WEB

OBJECTIVE: Students will become aware of the interrelationships which exist between plants and animals in the urban environment.
MATERIALS: Food web cards provided, magnifying glasses (optional), rope
TIME: 1 hour

Now that your students have had an opportunity to examine plants and the behavior of at least one familiar animal, introduce them to the idea of interrelationships in nature. You may want to begin by building a simple food chain. For example: plant (oak tree) - squirrel - hawk. Your students can see that the squirrel relies on the oak tree for food (and possibly shelter). Ask if they can think of any way that the squirrel assists the oak tree. Ask if they have observed squirrels burying acorns in the fall and what might happen if the squirrel doesn't retrieve some of them. Are they aware that squirrels can help "plant" oak tree seeds (acorns)? These are simple interrelationships that are of course more complex in nature. Food chains combine to form food webs since more than one animal eats each plant and many animals consume the same prey.

Tell your class they will be going out to investigate the food web in a natural area or vacant lot near your school. If you have magnifying glasses available, distribute them to your students and allow them to explore the area. Have students turn over rocks or logs to look for critters and look for examples of feeding (chewed leaves, cracked acorns or walnuts, clumps of fur or feathers, etc.) When your students have had a chance to locate some of the vacant lot inhabitants, pull them together to discuss their finds and release any "captives." Then form two circles and distribute the food web cards to your students. They should place the cards around their necks. Begin illustrating the interrelationships by having the sun hold the rope and connecting it to the plant and to those dependent on the plant. Have students consider what each member of the food web will eat.

Once the strings have been attached between the various inhabitants of a vacant lot, you will have a food web. Now ask the class which members of the food web could be taken away? For example what would happen if we did away with all of the snakes? There would be too many frogs. The frogs would not have enough grasshoppers to eat. If the field mice all disappeared the cats would not have enough to eat. Distinguish here between wild cats and domestic pets cared for in homes. The fungus in the food web are the decomposers. The children will be familiar with toadstools or mushrooms. Explain that they are plants that help to decay things which are no longer living. These decomposers help to provide nutrients for the plants. The plants can not live without them.


Sun
Field Mouse
Bug
Plant
Grasshopper
Worm
Spider
Frog
Cat
Snake
Robin
Fungus

These plants and animals are able to live in the urban environment because they are adapted to do so. Adaptations include protective coloration, or color to hide, color to attract (flowers are beautifully colored to attract insects). Other adaptations include beak structure of various birds - robin beaks are adapted for digging worms. The beak of a hawk is designed for tearing its prey. The following activities are designed to teach the concept of adaptation.

HIDDEN WORMS

OBJECTIVE: Students will become familiar with the importance of color as a protective adaptation and the role of beak structure as an adaptation for consumers.
MATERIALS: 50 toothpicks (10 green, 10 red, 10 blue, 10 yellow, and 10 brown), masking tape
TIME: 45 minutes

Before going outside, explain to the class that they are going to become consumers or predators. They will become birds seeking worms for food. The worms will be colored toothpicks of various colors. Divide the class into 2 groups of birds who will use their hands as beaks. Tape the thumbs of one group to their hands with masking tape. The other group will have full use of their hands.

Take the 2 groups to a vacant lot or the school lawn. Have them form 2 separate circles. Explain that they will each have 1 minute to consume as much food as they can. Have them close their eyes while you randomly scatter the colored toothpicks within each circle. Give them the signal to begin.

After a few minutes, pull the groups together and have them tally the number of various colored "worms" they have gathered. Compare the results of the 2 groups and discuss possible reasons for differences. Discussion questions: What effect did taping the thumbs of one group have on their ability to gather food? Which color of toothpicks were most commonly found? Why? If you were an animal trying to survive in this environment, what color would you like to be? What "shape" of prey would be easier for the taped-thumb group to consume? How and why do the beaks of various birds differ?

INVENT A CITY CRITTER

OBJECTIVE: Students will explore some possibilities for animal adaptation to the urban environment.
MATERIALS: Drawing paper and colored pencils or crayons
TIME: 1 hour

Have your students "invent" a critter by drawing one to adapt to various conditions. Divide the class into 5 groups. Have each group invent a critter that could live in 1 of the following conditions:

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

1. Invent a critter that lives on the outside wall of the school building.

2. Invent a critter that lives on the school's asphalt playground.

3. Invent a critter that lives in a teachers' parking lot.

4. Invent one that lives on the school lawn.

5. Invent one that lives on the sidewalk in front of the school.

Things for the "inventors" to consider: What does the critter eat? (spilled gas and oil, gravel, grass, children's litter, insects on the wall, etc.) How does it protect itself? (from the lawnmower, car tires, children running, etc.)

Once the critters have been invented, have the students share their drawings and explanations for why the critter is designed the way it is. Have them write descriptive paragraphs about the critters. "I am a wall climber..." Display their critters with descriptive paragraphs beneath them.

Extensions

Initiate a discussion about the farmers as producers of food for people. Discuss the various crops grown in your region and those imported from other parts of the country. Ask your students if people in the city can live without farmers. Ask what people in the city provide for people living on farms.

Have your students study birds in the urban environment. What birds are our urban neighbors? How are they adapted to live in the city?

79

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

ADJECTIVES HUNT - Adjective Cards

RIBBED

SHARP

LIMP

SPONGY

SMOOTH

STIFF

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

ADJECTIVES HUNT - Adjective Cards

FUZZY

PRICKLY

ROUGH

WET

DRY

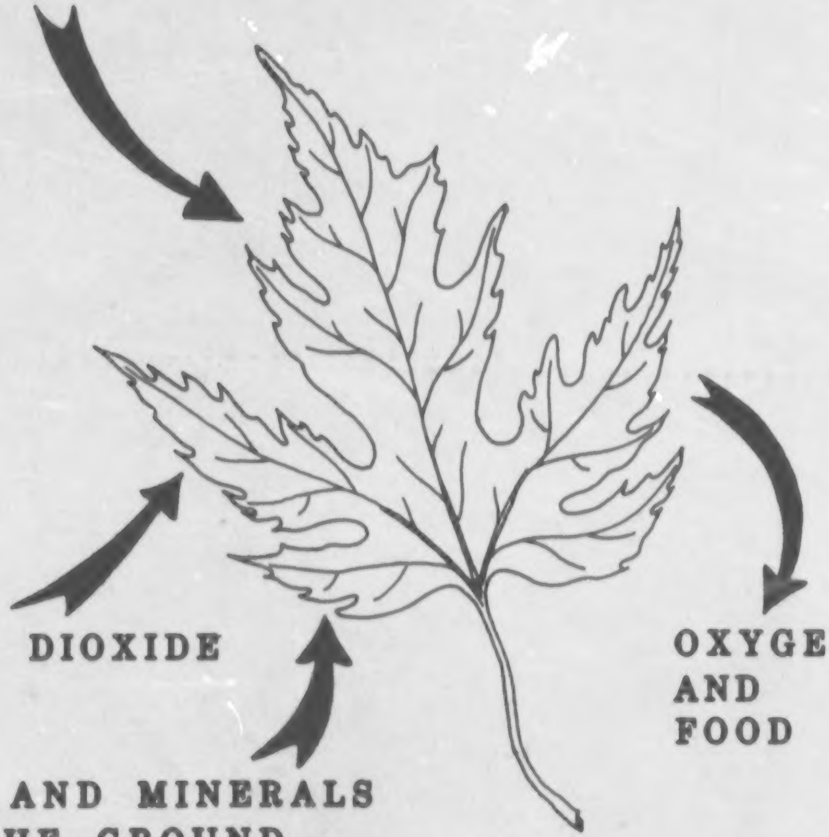
BUMPY

81

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

PHOTOSYNTHESIS

Photosynthesis is the process by which green plants manufacture food.



SUNLIGHT ENERGY

CARBON DIOXIDE IN AIR

WATER AND MINERALS FROM THE GROUND

OXYGEN AND FOOD

TRANSPARENCY

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

ANT ANTICS

1. Look for an anthill outside. Are the ants carrying food? Do they pay attention to each other?

2. Watch the way the ants move along "trails". Place an obstacle in the path of an ant. How does it get around the object?

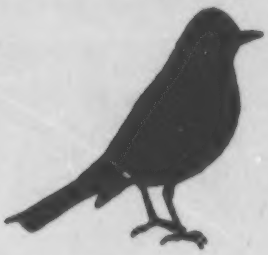
3. What do you think ants like to eat? Place different kinds of food near their trails and see what they do. Foods: cheese, bread, and small amounts of sugar. Using a stop watch see how long it takes the ant to go to the food.

4. How fast do ants travel? Measure off one foot of space along the ground or sidewalk. Use the stop watch to see how many seconds it takes the ant to travel one foot. Try three trial runs and find the average speed the ant travels. How far would the ant travel in one hour?

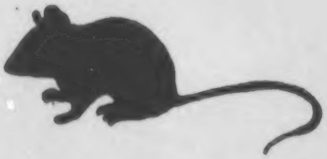
80 83

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

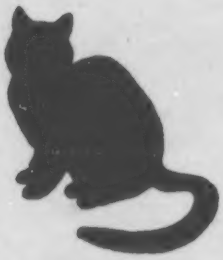
NATURAL NEIGHBORS - Food Web Cards



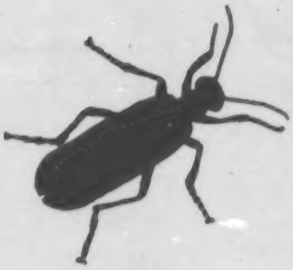
ROBIN



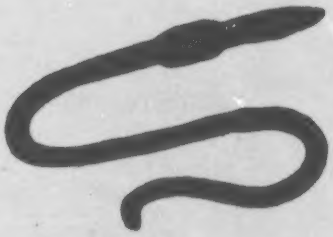
FIELD MOUSE



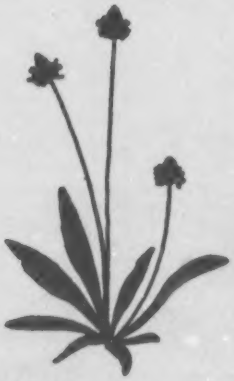
CAT



BUG



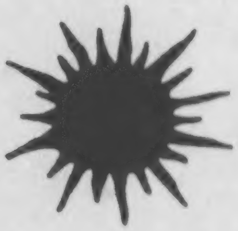
WORM



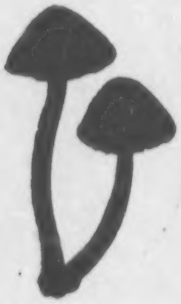
PLANT

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

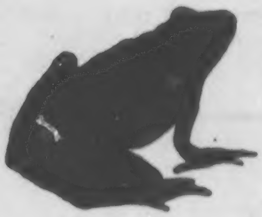
NATURAL NEIGHBORS - Food Web Cards



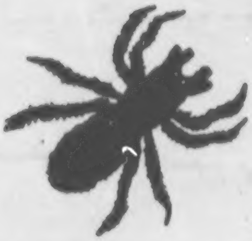
SUN



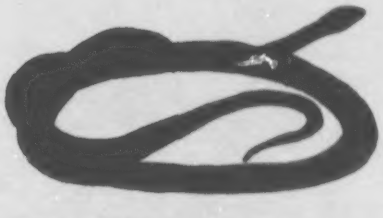
FUNGUS



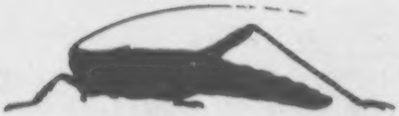
FROG



SPIDER



SNAKE



85

82

GRASSHOPPER

Natural Neighbors. Copyright 1982, Schlitz Audubon Center.

LESS IS MORE

Activity	Focus	Activity Sheet	Subject Area
Clean It Up Campaign	Solving the local litter problem		Social Studies Science Art
Nature's Clean-up Crew	Decomposers in nature	x	Science Language Arts
Worm's the Word	Importance of worms in soil		Science
Make A Recycling Jar	Variable rates of decomposition of natural and human-made objects		Science
Where Is Away?	Local waste disposal and recycling	x	Science Social Studies
Checking Out the Supermarket	Packaging and energy consumption at the supermarket	x	Social Studies Science
Concerned Consumer Survey	Consumer decision-making	x	Social Studies

Less Is More. Copyright 1982, Schlitz Audubon Center.

LESS IS MORE

Teacher Information

CONCEPTS:

There are many different kinds of refuse that have varying degrees of impact on the environment.

Decomposers in nature can break down only some of the items we discard.

Everything must go somewhere.

Individuals can have a positive influence on their environment through recycling efforts and wise consumer decision-making.

We hear a lot about the environmental problems these days. The news stories of the day are filled with gloomy accounts of environmental degradation. So often children are overwhelmed by these environmental problems and feel frustrated at their lack of control over them. They come away feeling incapable of contributing to solutions. These activities deal with some solutions and people's participation in those solutions.

CLEAN IT UP CAMPAIGN

OBJECTIVE:	Students will investigate the litter problem in their immediate environment and initiate a campaign to solve it.
MATERIALS:	Large poster board, paper bags, construction paper, marking pens
TIME:	3-4 one hour sessions with 1 hour follow-up a few weeks later

There is more to pollution than litter on the school grounds, but this can be a good starting point to raise the awareness of your students. They can investigate an environmental problem that exists in their neighborhood and one which they can exercise some control over.

Prepare a large poster data board with the following categories:

85 83

Paper/Wood	Plastic	Metal	Glass	Other

Have each child bring a large paper bag from home. Then take your class outside and have each of them pick up 5 pieces of litter. Bring them together in a large circle and ask each student to rank order their litter from most to least objectionable. For example, some students will object most to litter which could be dangerous, like broken glass, while others may object to plastic or items which could have been reused. Ask some students to share their rank order of litter and relate their reasoning. Place the large data board in the center of the circle and ask someone to place an example of each of the categories in the appropriate column. Ask students which of the 5 kinds of litter might be most common on the school grounds or in the neighborhood. Discuss how they might find out.

Have the students work in pairs to collect as much litter on the grounds or surrounding area as they can find. When they have finished, compile all of the garbage, classify it according to materials, and make a tally of the number of pieces of litter in each category.

Ideas for discussion:
Which items can be decomposed by nature?
For example, paper and wood are biodegradable, plastics are not.
Which items could be returnable or reusable?
What will happen to the various items if we never pick them up?
How many of the items are packages?
Is the packaging necessary?

Return to the classroom and post the data board in a prominent place. You will need it again in a few weeks. Discuss the litter problem with your class. Ask them how they might participate in an effort to solve the problem. Interviewing the school janitor may shed some light on the problem. Students could find out how much of his time is spent picking up litter and how often garbage cans on the school grounds are emptied. Ask the class to think of solutions to the litter problem. They could begin a "Clean It Up Campaign" in your school. As part of this campaign, students could make posters and distribute them around the school and in the neighborhood (at the drug store counter etc.) They could paint anti-litter slogans on the outdoor garbage cans. Students could select representatives to go into other classrooms and campaign for a cleaner school grounds or the class could put on a skit to present encouraging participation in the clean it up campaign. Students could also start a recycling center at the school. Newspapers could be collected to be recycled by insulation or paper companies.

Less Is More. Copyright 1982, Schlitz Audubon Center.

After a few weeks ask the students how they might find out if their campaign has been effective. Look at the initial tally of litter on the data board and discuss whether litter has been reduced in the area. Your class will probably conclude that one way they could test the effectiveness of their campaign would be to again collect and classify litter. They could tally their results and inform the other classes of the litter situation. A follow-up investigation a month or two later may also prove interesting.

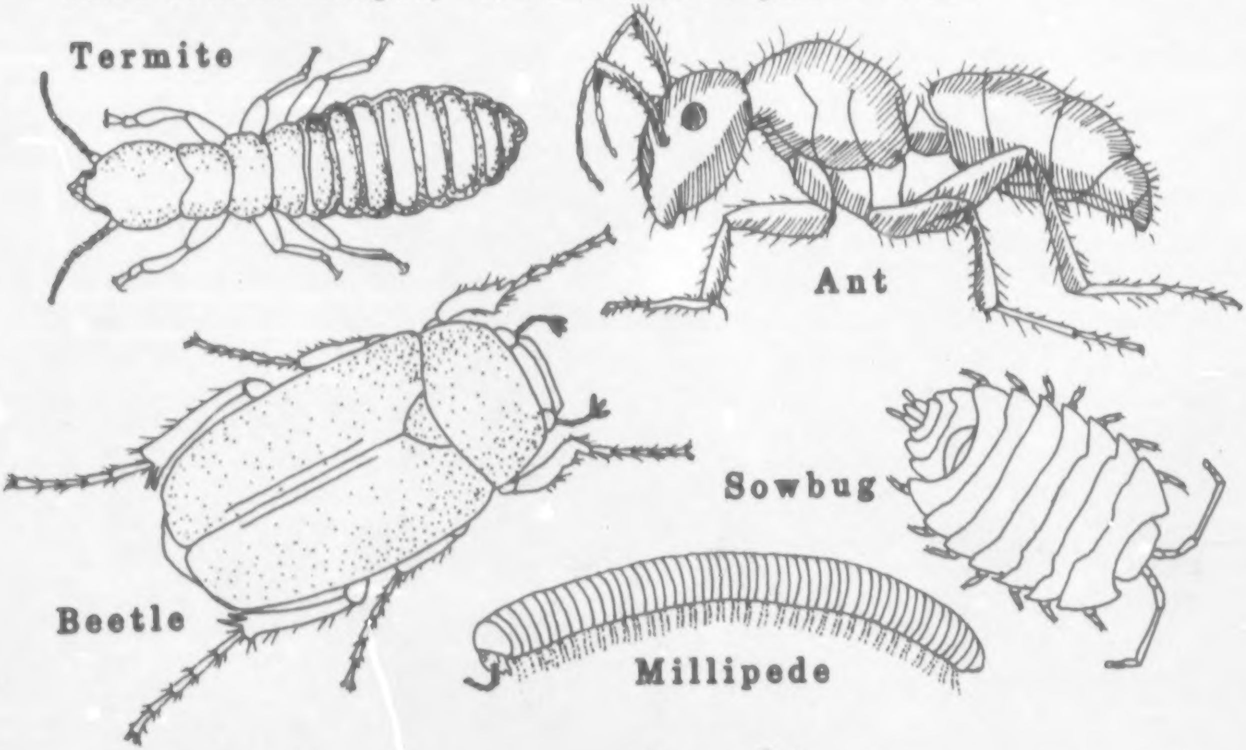
NATURE'S CLEAN-UP CREW

OBJECTIVE: Students will become more familiar with decomposers in nature.

MATERIALS: Mystery cards provided, magnifying glasses, 2 small trowels

TIME: 1 hour

Without nature's clean up crew none of the natural litter or refuse that we generate would ever be decomposed. The decomposers in nature are the plants and animals that live on dead tissues and break them down to be made available as nutrients again. Members of the clean up crew include beetles, beetle larvae, termites, ants, sowbugs, pillbugs, millipedes, and other invertebrates which feed on decaying wood and other organic matter.



Less Is More. Copyright 1982, Schlitz Audubon Center.

Plants also contribute to decomposition as thousands of non-green plants, ranging from bacteria to mushrooms, break down organic matter. In living on dead plant and animal materials, they break big molecules down to small ones, which are then reused by plants in the production of food and oxygen. Fungi, one of a group of recycling plants, can grow in the dark and cannot make their own food. They absorb food from other plants and animals, either living or dead. One reason that fungi are so common in woodlands is that there are such enormous quantities of dead leaves for them to feed on. You can find miniature examples of woodland decomposition in the shrubs on or near your school grounds.

Copy enough mystery cards so that each student has one mystery to solve. Have students work individually or in groups to solve their mysteries. Distribute the cards to your students and tell them they are going to investigate the miniature world of decomposition on your school grounds. Provide some magnifying glasses and small trowels for digging. Students will find clues to their mysteries under shrubs in the leaf litter and in the soil. Discuss ways they can explore the area without harming nature. All of the decomposers they find should be returned to the soil and leaf litter, and care should be taken not to damage roots of plants.

After they have tried to solve their mysteries, discuss their finds. You may want to initiate a discussion right on the school grounds or return to the classroom. Ask what would happen to natural litter if there were no decomposers in nature.

Some of your students may express dislike for the "critters" they will find. To enhance their appreciation for the decomposers, have them research some of the interesting habits of these plants and animals and write a report of their findings.

WORM'S THE WORD

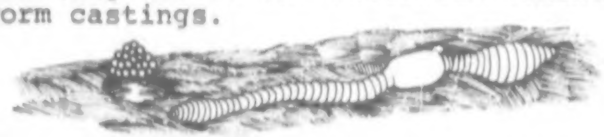
OBJECTIVE: Students will gain an appreciation for the importance of earthworms in nature.
MATERIALS: 2 small trowels
TIME: 45 minutes - 1 hour

Worms are interesting creatures that many students are wary of. This activity is designed to help your students appreciate the importance of common earthworms in their role of loosening the soil and turning under decayed material.

88 91

Background information: The earthworm's body is a simple structure composed of two tubes, one within the other. The inner tube is the digestive system. The black color is the food in the digestive tract. The earthworm's long body is divided into segments. Each segment bears several stout bristles, which are used to assist the animal's movement through the soil. The head is small and there are no eyes at all. Earthworms are able to "sense" light and darkness through special cells on the skin, but cannot actually focus on anything. Students could observe this as worms are exposed to light. They are nocturnal and are usually not seen during the day. Each worm is both male and female, a hermaphrodite. The clitellum secretes a coccoon in which the fertile eggs are laid. Cutting an earthworm in two never makes two worms. If the tail is cut off, it grows a new one; but if it is cut anywhere between its head and clitellum, it dies.

Take your class outside to learn more about earthworms first-hand. Have your students dig up a small area of soil and watch the behavior of worms. Compare the size of earthworms. Are they all adults? (Adults will have a swelling called the clitellum behind their heads.) Look for earthworm castings.



Castings are the manure which is excreted in the form of pellets in the soil. These pellets contain lime which helps to enrich the soil. Students could also compare the number of earthworms in a grassy area and a bare soil area. Discuss the important function of earthworms: turning under decayed plant and animal matter which helps to fertilize the soil, loosening the soil for plant roots etc. Worms occasionally even plant seeds by dragging leaves down into their holes for insulation, pulling the seeds of trees with them as they go.

MAKE A RECYCLING JAR

OBJECTIVE: Students will conduct a recycling experiment to determine how long it takes various objects to decompose.

MATERIALS: A large glass container, soil, natural and human-made litter

TIME: 1 hour initial session with intermittent follow-up sessions

To make a recycling jar your students will need to collect some soil from either a garden plot, vacant lot, or from the school grounds. Do not use potting soil. Place the soil into a fish bowl or other glass container. A broken or cracked glass aquarium would work fine. Have the class choose about 5 or 6 objects to put into the jar to recycle. Choose natural and human-made objects such as leaves, sticks, cut-up apple, cigarette butts, candy wrapper or something plastic. Put these into the jar and lightly cover with soil. Sprinkle a bit of water on, cover and let it be. Put it on the windowsill. Have your students keep a record of the progress the decomposition takes. You may want to add an earthworm to the jar and watch its trails, burrows, and castings as well.

WHERE IS AWAY?

OBJECTIVE: Students will perceive some of the problems related to waste disposal and the importance of recycling in dealing with the problem.
MATERIALS: Activity sheet provided
TIME: Approximately 1½ hour field trip

Arrange to take your class to the city landfill to raise their awareness of waste disposal problems and to reinforce the concept that there is no away. Discuss the items on the student activity sheet with your class prior to the field trip.

Some cities do burn some of their garbage and use the heat to generate electricity. The useable garbage is first shredded, then fed into boilers and burned to generate electricity. Air pollution may be a problem with this method though.

Have the students find out if your city sanitation department makes any effort to recycle paper, glass, metal or plastic. Our wasteful habit of using cans and bottles only once and then burying them in our landfills should be considered by your class. We now throw away enough cans each year in the U.S. to make 25 columns reaching from the earth to the moon! If your state does not have a returnable bottle law, students could write to local legislators to support such legislation.

Efforts are now being made to recycle plastics. Two women in Sauk County, Wisconsin have initiated a recycling program modeled after the Japanese method of recycling plastic. Thermoplastic, which becomes soft when heated, can be recycled. Plastics are separated by type and then ground in a plastics grinder and finally returned to the manufacturer to be recycled.

Conclude this activity by discussing what individuals can do to reduce the amount of garbage thrown away each day.

Less Is More. Copyright 1982, Schlitz Audubon Center.

CHECKING OUT THE SUPERMARKET

OBJECTIVE: Students will critically evaluate the use of energy and packaging at the local supermarket.
MATERIALS: Activity sheet provided
TIME: 30 minutes to 45 minutes class time

As your students have now discovered, most of our litter is generated from packaging. Packages take many forms - cans, bottles, boxes, cellophane wrapped packages within packages, etc. ad nauseum. Today more and more products are being manufactured to meet the needs of busy consumers. Our hurried lifestyles in this land of consumer goods leads us to buy more things than we make ourselves. Unfortunately, much of what we buy is over-packaged. Packaging causes pollution - litter ends up in our streets, landfills usurp valuable land, burning causes air pollution, and streams and lakes are polluted as well. Packaging also uses up resources from the Earth which could be recycled. In this activity students are encouraged to take a critical look at packaging in a trip to the local supermarket. Distribute the "Checking Out the Supermarket" activity sheets to your students. Ask them to fill the sheets out individually at their local market.

When they have completed this task, ask them to discuss their ideas for changing the supermarket. Generate a discussion about packaging. You might ask students what a basket, an orange peel, and a plastic bag all have in common. They are all containers - one first made by people long ago to contain food and other items, one made by nature to protect fruit, and the other produced more recently by people to hold a variety of objects. How are these "containers" different? Do we need to package "nature's packages" like oranges, apples or grapefruits in plastic to carry them home? Which packages in the supermarket were necessary? Why? Could some of the items be sold without packages? Why are some of the packages brightly colored? What is packaging made from? Where do these packages finally end up? What kinds of packages did your great-grandparents use? Discuss the possibilities for individual actions which students can take such as re-using plastic and paper bags, recycling jars and cans, writing to the supermarket etc.

Less Is More. Copyright 1982, Schlitz Audubon Center.

CONCERNED CONSUMER SURVEY

OBJECTIVE: Students will examine their own and their families' consumer patterns from an environmentalist point of view.
MATERIALS: Activity sheet provided
TIME: Outside assignment, ½ hour class time

Ask your students to define a "concerned consumer". Have them brainstorm a list of things a concerned consumer would do. When they have run out of ideas, give them each a copy of the "Concerned Consumer Survey". Have them add any items not included on the list and ask them to rate themselves. They should also interview their parents and other family members to find out where they stand as concerned consumers. Emphasize that they sould try to be honest with themselves when completing the survey and that they won't be required to share their responses.

Encourage a class discussion about the surveys. Which actions did students feel would be the most difficult to carry out and why. Which did they feel would be easy to comply with? Were there any overall differences in the parents' responses from the childrens' responses? How important are our individual actions?

Extensions

Have students form investigative teams to discover: What kinds of packages were used 100 years ago? How does advertising on packaging affect consumer choice? What are other communities doing about recycling?

Take a closer look at some of nature's packages. Examine orange peels, peanut shells, etc. under a microscope.

Find out what is happening to the forests in your state. It takes 17 trees to make 1 ton of paper from wood. Students could compose letters to paper and/or lumber companies to find out about reforestation efforts. Letters to the local forest service office could also yield information about the status of forests in your area.

Students could interview elderly people about packaging years ago. The all too familiar plastic bubble packs we use for hardware and household items were not always around. Change in services could be related as well, such as the delivery of milk in reusable glass bottles.

Less Is More. Copyright 1982, Schlitz Audubon Center.

MYSTERY CARD

I'm a long, legless creature who lives underground. Find the clues I leave above the ground.

Earthworm. Clues are the castings, which are tiny pellets of soil excreted by worms and their holes in the ground.

MYSTERY CARD

I'm a plant that is not green. I help to recycle things in nature. Can you find me? What am I called?

A fungus (commonly called a mushroom or toadstool). The above ground mushroom is the fruiting body. The major part of the fungus are the white threadlike strands called mycelium.

MYSTERY CARD

I'm a creature that leaves a wet, sticky, slimy trail behind me. It helps me to move across the ground. Who am I? Can you find where I live?

A snail or slug. Live in moist places, under leaves, boards, etc.

MYSTERY CARD

Find me! I am a creature that likes to live in damp or wet places. I have many legs and I breathe through gills.

Sowbugs are actually crustaceans, related to lobsters and crayfish. They carry their eggs glued to their abdomens. (Hint: you might find me under a rock).

MYSTERY CARD

Where did the leaves go?

Find the clues to the disappearance of last year's leaves.

Leaves are decomposed by the action of earthworms and fungus. If children turn over a pile of leaves they will find them in various stages of decomposition. Look for the white threadlike strands of fungus.

MYSTERY CARD

TEACHER:

This one is open, for you to fill out.

96

Less Is More. Copyright 1982, Schlitz Audubon Center.

MYSTERY CARD

I'm a long, legless creature who lives underground. Find the clues I leave above the ground.

MYSTERY CARD

I'm a plant that is not green. I help to recycle things in nature. Can you find me? What am I called?

MYSTERY CARD

I'm a creature that leaves a wet, sticky, slimy trail behind me. It helps me to move across the ground. Who am I? Can you find where I live?

MYSTERY CARD

Find me! I am a creature that likes to live in damp or wet places. I have many legs and I breathe through gills. (Hint: You may find me under a rock.)

MYSTERY CARD

Where did the leaves go?

Find clues to the disappearance of last year's leaves.

MYSTERY CARD

97

94

Less Is More. Copyright 1982, Schlitz Audubon Center.

WHERE IS AWAY? A trip to the landfill

When you throw things away, where do they go? Let's find out.

1. What happens to the garbage at the landfill?

2. Are any of the bottles, metals, or cans recycled?

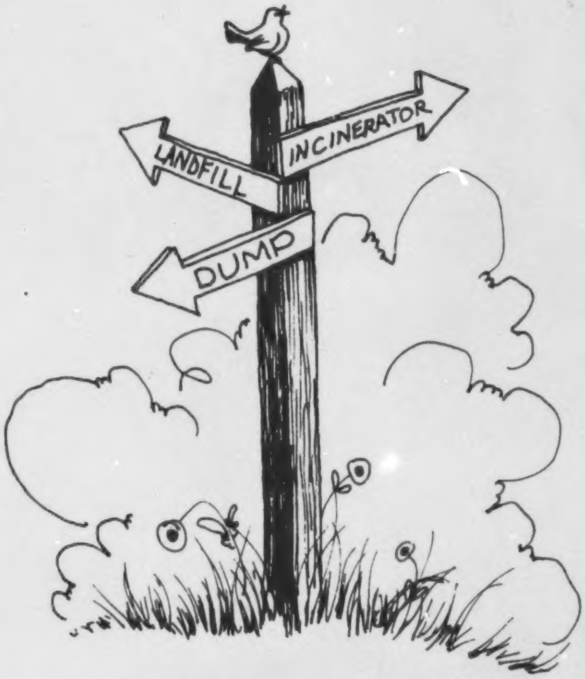
3. Will the garbage ever really go away? Where is away?

4. What would happen if...

   - we burned all the garbage?

   - the gabage pile grew bigger every hour? Does it?

   - we shipped the garbage into outer space?



5. Did you know that each of us throws away an average of four pounds of garbage every day? How many pounds of garbage would that be in 1 week? One year?

6. What can you do to reduce the amount of garbage you throw away every day?

Less Is More. Copyright 1982, Schlitz Audubon Center.

CHECKING OUT THE SUPERMARKET

Does your supermarket make an effort to save energy? Do they sell items in returnable containers? Take a trip to your local supermarket and see how it measures up.

Find and list the items which you can buy unwrapped.

Can you find any products that are sold in a returnable container? Which ones?

Find an example of a fruit or vegetable that is packaged 4 different ways. What is it? ________________________

	How is it packaged?	Weight?	Price?
Fresh			
Frozen			
Canned			
Dried			

(Example: fresh grapes, not packaged; frozen grape juice in a can; canned grapes in fruit cocktail; and dried as raisens in a box)

Which of these 4 methods of packaging do you think uses the most energy and resources? Which costs the most per pound?

Does the frozen food section have glass covers or doors over the frozen foods? Is it a good idea to have glass doors? Why or why not?

Notice the ceiling lights. Is the store too brightly lit, just right, or not bright enough?

Can you find any products in the supermarket that come from another state? Another country? List them. How do you suppose they got here?

How many aisles have:

frozen foods________________

canned foods________________

fresh foods_________________

non-food items______________

Think! If I could make my supermarket more energy-efficient and less wasteful, I would...

CONCERNED CONSUMER SURVEY

I can't.	I don't want to.	I might.	I'll do it sometimes.	Easy, I'll do it.	RECYCLING CENTER
					Throw papers in trash cans.
					Use dishes instead of paper plates.
					Use re-useable cups instead of paper cups.
					Save newspapers for recycling.
					Use the back of writing and drawing paper.
					Save envelopes and wrapping paper to use again.
					Wrap presents in old newspapers.
					Ask your school to buy recycled paper.
					Save cans and bottles for recycling.
					Use plastic bags over and over.
					Avoid buying things in plastic containers.
					Don't use the toilet as a waste basket.
					Put garbage into a compost pile.
					Fix things instead of throwing them out.
					Save parts from old bikes to fix new ones.
					Give outgrown clothes to someone smaller.

* Adapted from Save the Earth by Betty Miles

Less Is More. Copyright 1982, Schlitz Audubon Center.

ENOUGH FOR EVERYONE?

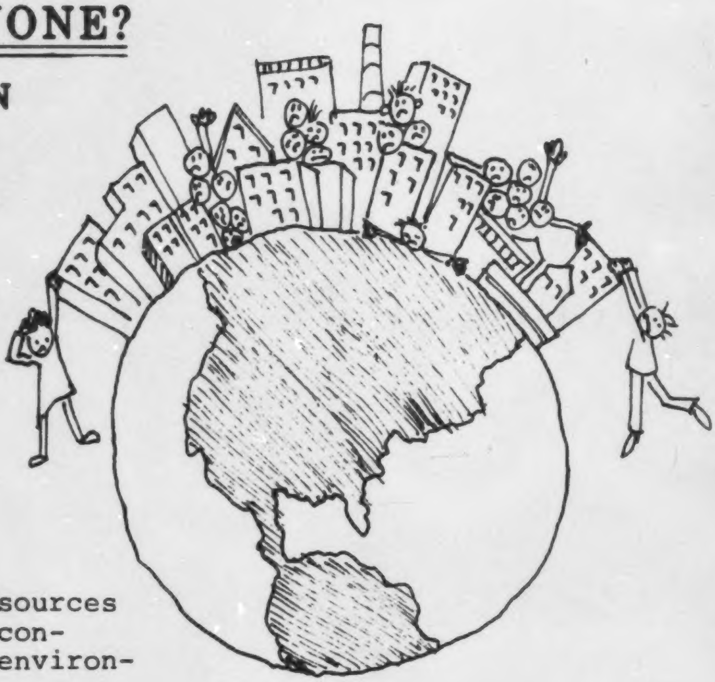
Activity	Focus	Activity Sheet	Subject Area
Move Over!	Over-population and resources		Social Studies Science
What's A Billion?	Conceptualizing large numbers		Math Social Studies
Food For Thought	Population control & food for the Earth	X	Math Social Studies
Resources For All?	Global distribution & consumption of resources		Science Social Studies
Conserve It!	Energy conservation	X X	Science Social Studies
Noise Makers - The Sounds Around You	Crowding & noise	X	Social Studies
The Year 2001	Basics for a new society	X	Language Arts Science

Enough For Everyone? Copyright 1982, Schlitz Audubon Center.

ENOUGH FOR EVERYONE?

TEACHER INFORMATION

CONCEPTS:



The world population is expanding rapidly

Increased population results in competition for resources, many of which are nonrenewable.

Overpopulation also causes noise and crowding.

Conservation and more efficient use of our resources through recycling will contribute to a healthier environment.

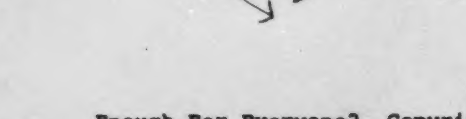
The global food shortage requires that more food be produced in developing countries and population control be increased.

MOVE OVER!

OBJECTIVE: Students will become aware of the effect of overpopulation on competition for resources.

MATERIALS: "Resources Box" with 4 pencils, 2 pens, 6 sheets of paper, 1 scissors, and masking tape.

TIME: 1½ hours



To begin this unit tell your class they are going to try an experiment dealing with classroom arrangements. Don't mention the idea of overpopulation or limited resources. These concepts will surface as the outcome of the activity. Select an area of the classroom to be used in this overpopulation experiment. An area approximately 10' x 10' should be marked with masking tape on the floor and two desks should be placed inside the area. Also provide a "Resources Box" with 4 pencils, 2 pens, 6 sheets of paper and 1 pair of scissors.

Enough For Everyone? Copyright 1982, Schlitz Audubon Center.

Select two volunteers to work in the square. They should take with them only the books they will need. One half hour later, select two more students to work in the square and add their desks to the other two. (Make sure to remove all "resources" from their desks first.)

Continue to add students to the area in shorter intervals of time similar to the way population grows rapidly. Add two more students twenty minutes later, two more fifteen minutes later, ten minutes later, etc. When the area can no longer hold additional desks, add students and have them share desks. Make sure the tasks the children are involved in will require the use of resources in the "Resources Box".

When the limited resources and overcrowded conditions lead to bedlam, bring the class together for discussion. Students who experienced crowding should relate their feelings and reveal the amount of work accomplished. Other students could contribute any of their observations of the crowded group. Noise, crowding, and competition for resources should be discussed. Ask the students if this experiment can help them draw any conclusions about the "real world." Ask what kinds of resources people use from the earth such as gas, oil, coal, copper, iron, wood, etc. Discuss which of those resources are nonrenewable and ways people should deal with nonrenewable resources such as recycling or conservation.

WHAT'S A BILLION?

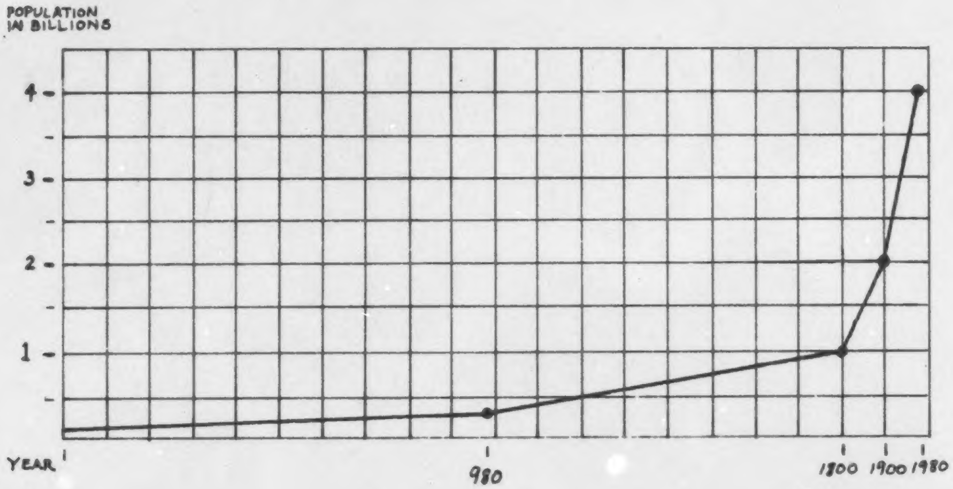
OBJECTIVE:	Students will demonstrate how much a billion is to help them conceptualize the magnitude of this number.
MATERIALS:	3 x 5 cards and a bulletin board.
TIME:	Approximately 2-3 hours

This packet addresses some issues which deal with large numbers. Dealing with population figures in the billions is rather difficult. How does one conceptualize a "billion"? Write 1,000,000,000 on the board. Ask, "How many hundreds are in a million?" "How many in a billion?" Devote some wall space in the classroom to the pursuit of conceptualizing a billion. Ask your students to figure out how they can demonstrate "a billion" on the bulletin board and then have them do it. Once they have demonstrated a billion, send them on a billion hunt to the library to look through newspapers, books etc. Ask them to record each of the instances involving a billion on a 3" x 5" card to place on the billion bulletin board. These instances could include federal budget figures, astronomy figures and population figures.

FOOD FOR THOUGHT

OBJECTIVE: Students will investigate the rate of population growth and some of the issues relating to global food production.
MATERIALS: Activity Sheet provided
TIME: One hour

The Global 2000 Report to the President predicts the world's population will reach 10 billion by the year 2030 and approach 30 billion by the end of the twenty-first century. To help your students visualize how our population has expanded over time have them plot the population growth on the graph in the student activity sheet.



Discuss some of the factors leading to population growth. The Industrial Revolution contributed to the expansion of food supply as manufacturing made it easier for people to exploit the environment. The rate of population growth has also accelerated with the advent of modern medicine. The math problems on the student activity sheet are designed to further your students' awareness of the overpopulation and hunger problems. This is a complex issue involving many factors and this activity is only an introduction to the problem. Additional resources are suggested at the end of this packet if you wish to explore this issue further.

Some of the topics related to this issue which students could explore include:

- The positive and negative aspects of the Green Revolution
- Hunger in the United States
- Farming the seas - A Blue Revolution?

106

102

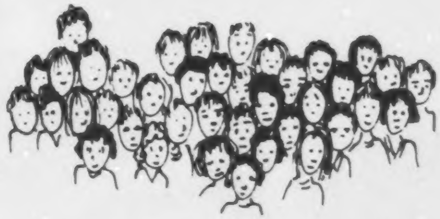
How many people are too many people?
Use of half of U.S. agricultural land to produce feed for livestock
Chemicals in agriculture - increased yields and pollution
Population control in developing countries

RESOURCES FOR ALL?

OBJECTIVE: Students will percieve the unequal global distribution and consumption of energy resources.
MATERIALS: World map, mural-size paper, colored pencils or markers
TIME: Two 1 hour sessions

Divide your students into seven groups to study the energy resources of:

North America
Latin America
Africa and the Middle East
Western Europe
USSR & Eastern Europe
Asia & Oceania
Australia



Ask them to find out what fossil fuels each of the regions has. An excellent resource for this is the February, 1981 issue of National Geographic which includes world maps of energy resources. Have the class make a world map on large paper and decide on symbols for oil, coal, natural gas, and uranium. These symbols could be cut out of construction paper or drawn into the map with colored markers.

Discuss the meaning of "energy consumption per capita" as average energy consumed per person for each of the regions. These figures are provided in the Global 2000 Report and are as follows:

Region	Approx. 1975 energy (BTU's) consumption per capita
South & Central America	8
North America	328
Africa	8
Australia	139
Western Europe	139-159
USSR & Eastern Europe	159
Asia & Oceania	8

107 103

Have your students record these consumption figures onto their map. When the map is complete, ask students to draw some general conclusions about the global fossil fuel distribution and consumption. They should conclude that resources are not necessarily found where the people are and that some countries consume more resources than others. It is interesting to note that the U.S. has only 6% of the world's population and uses 1/3 of the world's energy supply. Most of our energy, 92%, is obtained from non-renewable fossil fuels. This points to the critical need for conservation and the development of renewable energy technologies.

CONSERVE IT!

OBJECTIVE: Students will take a look at energy consumption in their school and investigate means of conserving energy.
MATERIALS: Activity sheet provided, pencils, scotch tape, cellophane
TIME: Two 1 hour sessions

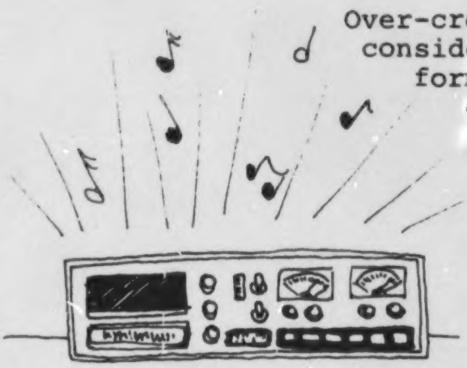
The student sheet for this activity includes an energy conservation checklist and directions for making a draft detector on the reverse side. Have students make their draft detectors before conducting their conservation check. Decide on some criteria to determine if energy is being wasted. For instance, do lights need to be on by sunny windows? Should heaters be located by the outside exits? What temperature should the hallways and other rooms be?

When the draft detectors are completed, have students check for drafts in the classroom. Then send out investigative teams for other areas in the school. Arrange to take the class to the boiler room to examine the furnaces and trace the ductwork to the classrooms.

Have the students compile their information, particularly on recommendations for conserving energy. Their information should be reported to the principal and the school board.

NOISE MAKERS - The Sounds Around You

OBJECTIVE: Students will become more aware of the relationships between over-crowding and noise and its effect on them as individuals living in the city.
MATERIALS: Tape recorder, activity sheets provided
TIME: 1 hour



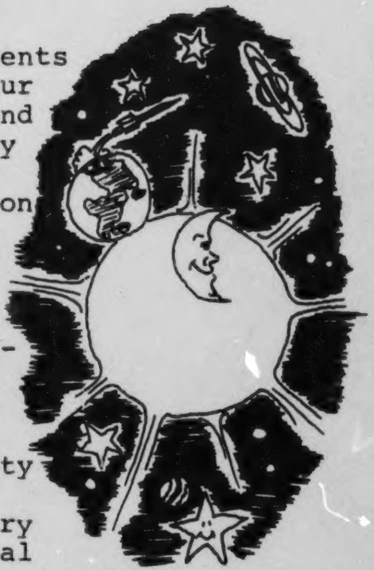
Over-crowding leads to noise pollution. Many consider noise to be one of the most neglected forms of pollution. People in cities are exposed to many sources of noise pollution. In a recent nationwide survey, noise was the number one complaint of city dwellers. Besides being an irritant, noise pollution has been found to contribute to increased incidences of heart and circulatory diseases, mental stress, ulcers, and digestive disturbances.

The federal government established a Noise Control Act in 1972 to deal with the problem and many cities have enacted ordinances in an attempt to control noise pollution. Using a tape recorder, take your class outside to discover the variety of sounds in their environment. Record the sounds on a busy street corner and on a more quiet street. See if street noises are reduced or buffered by vegetation. Have students record sounds they like and don't like. Return to the classroom to play back the sounds and have students relate their feelings about city noise. How much noise is too much? Can students distinguish natural sounds from human-made sounds? Was noise reduced by vegetation?

THE YEAR 2001

OBJECTIVE: Students will describe what they feel are essential resources and resource people to maintain a society.
MATERIALS: Activity sheet provided
TIME: 1 hour

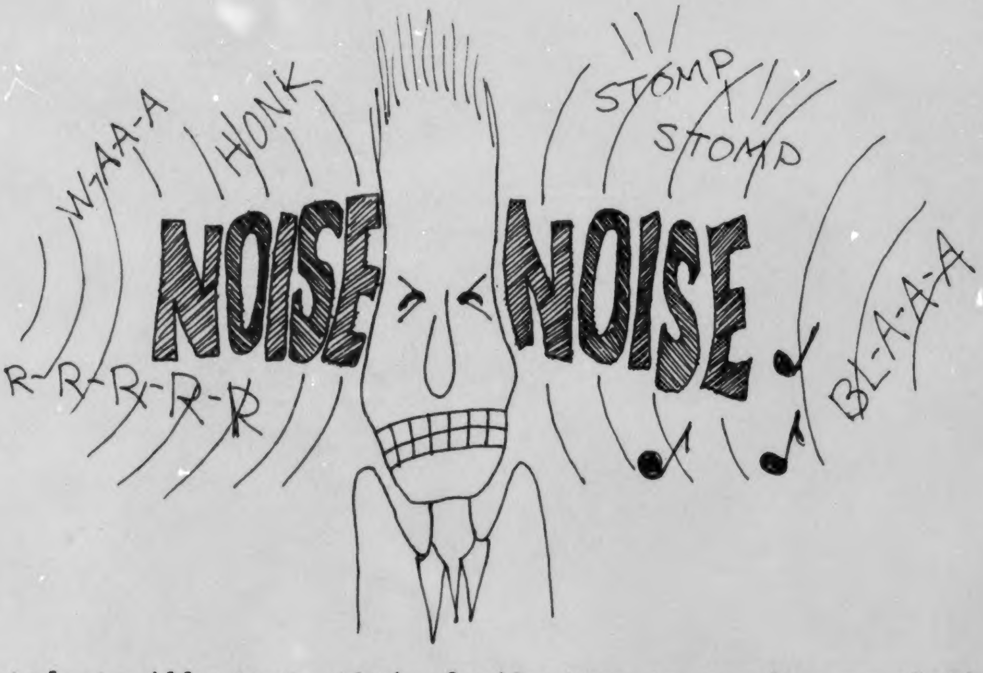
Enough For Everyone? Copyright 1982, Schlitz Audubon Center.



This is a creative writing exercise for your students to complete. Distribute the activity sheet to your students and ask them to consider the resources and people that would be vital to a new society. They should consider what skills might be necessary to colonize a new area and the cooperative interaction between people which might lead to their success.

Extensions....

Choose a day when you are going to cause a disturbance resulting in noise pollution in your class. Without explaining to the students, start the day speaking as loudly as you can. Using a tape recorder, play loud background noises (such as city traffic or construction work or a recording of students in the cafeteria!) while the students try to complete a demanding task. Ignore their initial reactions to the noise but when the distraction seriously impairs their progress, stop for a class discussion on noise pollution. Did they like it when you talked loudly, could they concentrate on their work with the loud noise, did they accomplish anything? Did the noises hurt their ears?



Have students illustrate their family tree to see how population expands exponentially. They should think about the resources each new person requires for their survival, food, shelter, energy, etc.

Students could conduct a conservation check of their homes using their draft detectors and a checklist of their own design.

For more information:

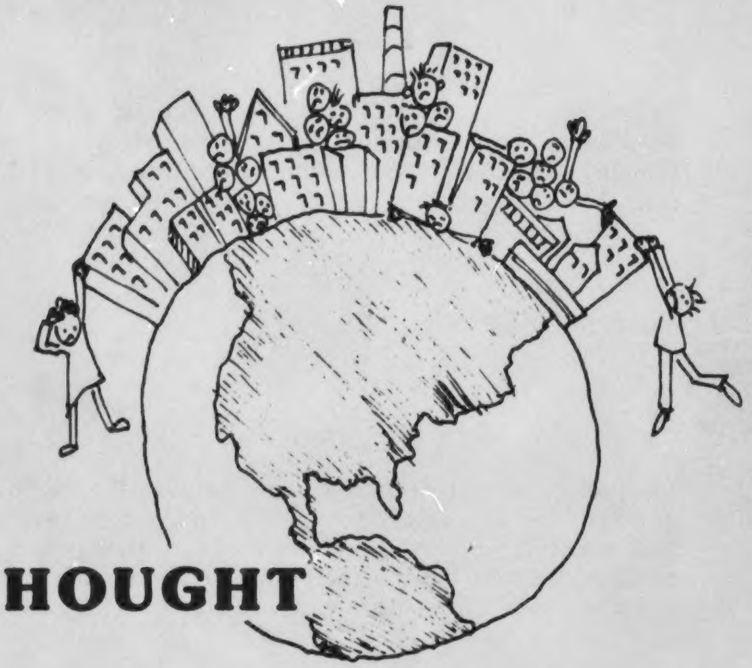
Hunger On Planet Earth
Jules Archer
T.Y. Crowell, 1977

Zero Population Growth
50 W. 40th Street
New York, NY 10018

One Earth, Many People
Laurence Pringle
Macmillan Co., New York

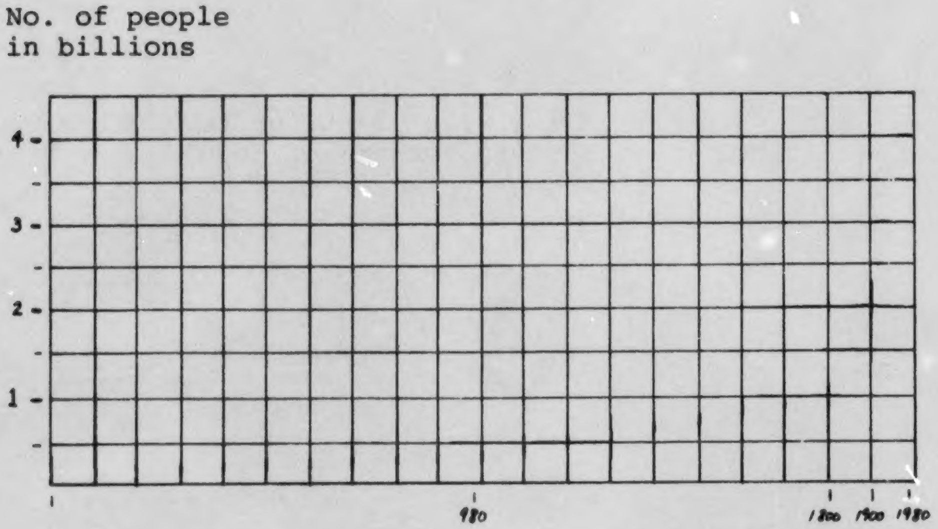
Tweedles and Foodles for Young Noodles
Melvina Reynolds
Schroeder Music
2027 Parker Street
Berkeley, CA 90247

The Global 2000 Report to the President
Entering the Twenty-First Century
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402



FOOD FOR THOUGHT

How fast is our world population expanding? Take a look at the figures below and then plot them on the graph.



Year	World Population
980	300 million
1800	1 billion
1900	2 billion
1980	3.9 billion

Did you know that 5 children are born every 2 seconds on our planet? How many children would that be in one minute? one hour? one day?

It takes 1 acre of arable land to feed 1 person for a year. Each person also requires 1/5 acre of paved land for homes, factories, roads, stores etc. How much land would be needed to support 5 people? How much land is needed to support your family?

It takes approximately 10 lbs. of grain to get 1 lb. of beef from cattle in a feedlot. If 1 acre of land produced 7000 lbs. of grain, how many lbs. of beef could be produced from it? Will more people be fed if we just use the grains, of if we use the grains to feed cattle and then eat the meat?

Did you know that a new nation the size of the United States is now appearing on Earth every 3 years because of population growth?

Enough For Everyone? Copyright 1982, Schlitz Audubon Center.

CONSERVE IT!

Find out if energy is being wasted in your school building. Conduct a conservation check using the following checklist. Turn this page over to find out how to make a draft detector to help you in your investigation.

	Lighting			Heating/Cooling			Other Electricity		
I think we use:	too much	too little	just right	too much	too little	just right	too much	too little	just right
in our classroom									
in the kitchen									
in the hallways									
in the gym									

Draft Detector Report

Where were the drafts the strongest? How many drafts did you find? How can they be prevented?

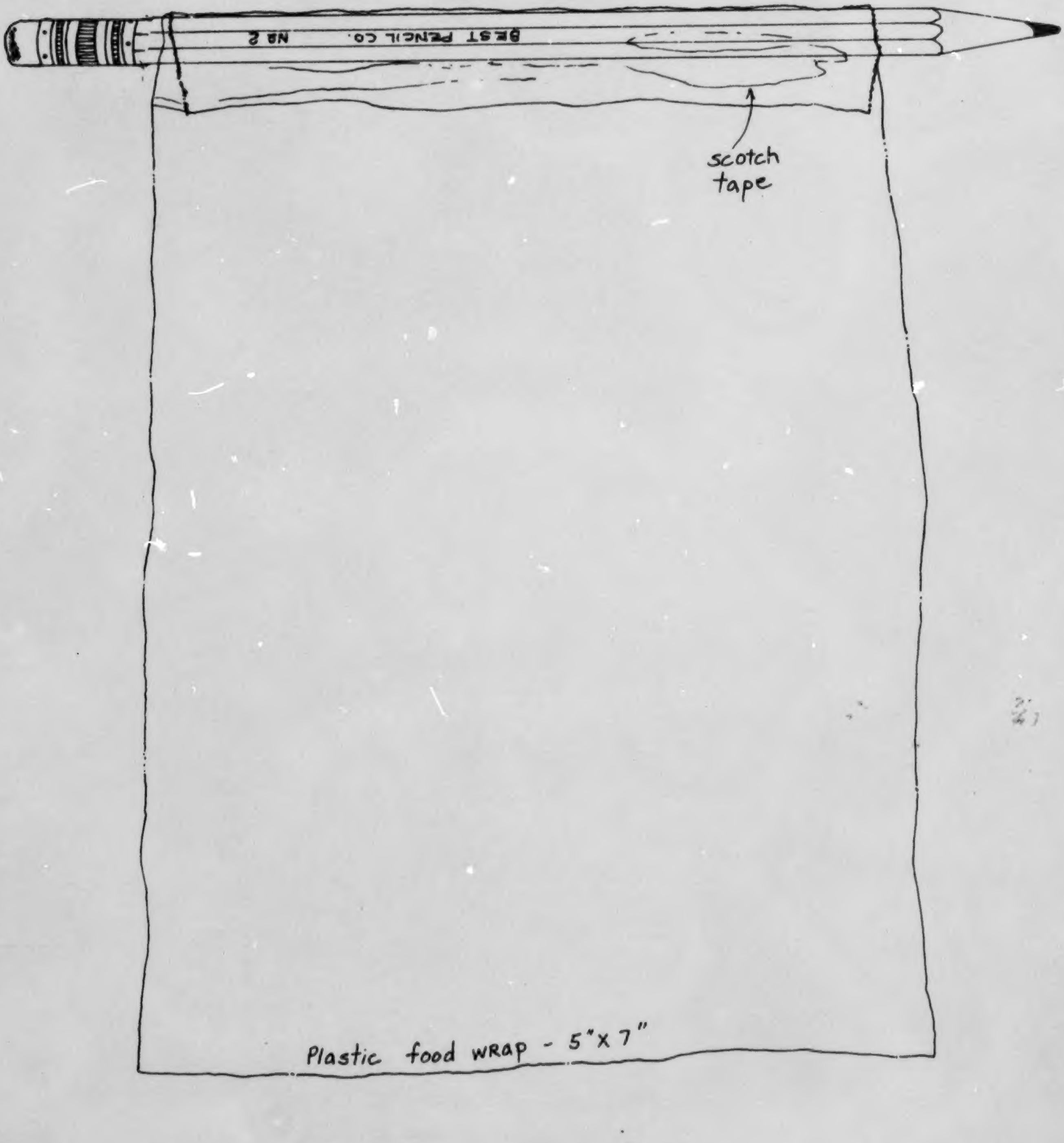
Find out what kind of fuel your school uses for heating and cooling. How much fuel is used each month?

List the ways that energy could be saved in your school.

114

109

DRAFT DETECTOR


BEST PENCIL CO. Nº 2
scotch tape
Plastic food wRap - 5"x 7"

Enough For Everyone? Copyright 1982, Schlitz Audubon Center.

TOO LOUD!!!
BANG

NOISE MAKERS

How much noise is too much noise? What sounds do you like to hear and what sounds really bug you? Tune into the sounds around you and really listen...

In My School	Sounds I like	Sounds I don't like
crowded spot uncrowded spot		
In My House		
when there are many people around when I am alone		
In My Neighborhood		
crowded spot uncrowded spot		

Look over your list and decide if sounds you like are made by people, machines or things in nature. What about the sounds you don't like?

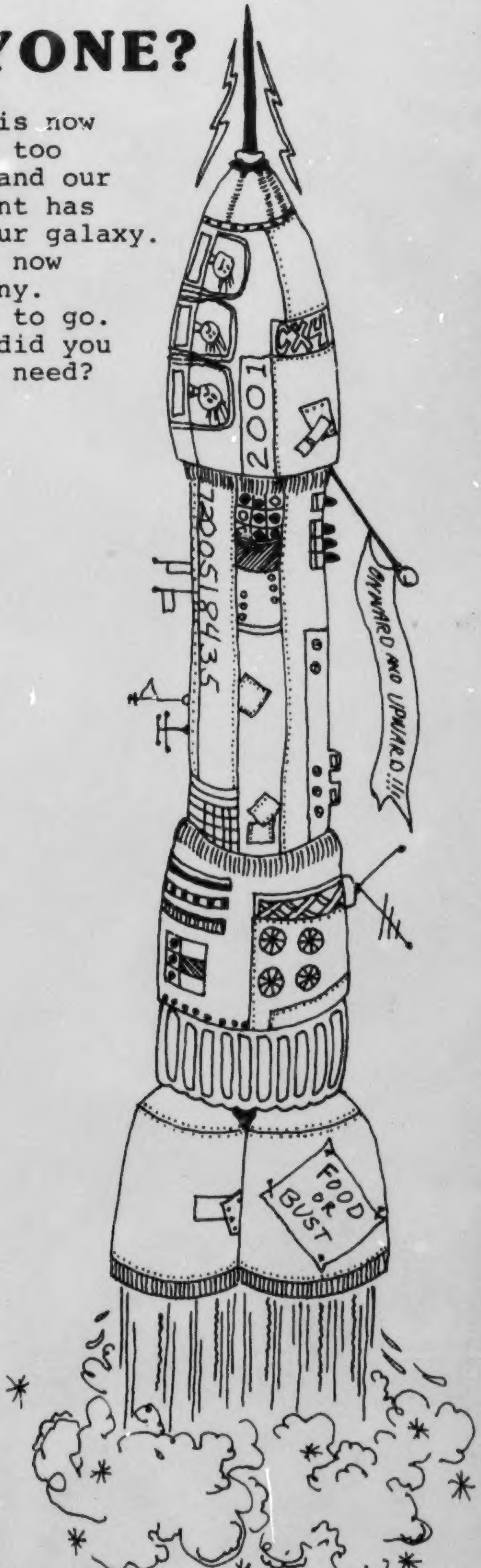
Do you hear more sounds you like in crowded places or uncrowded places?

116

Enough For Everyone? Copyright 1982, Schlitz Audubon Center.

THE YEAR 2001
ENOUGH FOR EVERYONE?

It is the year 2001. The world population is now seven billion people. The world has become too crowded, too many people are going hungry, and our fossil fuels are almost gone. The government has decided to try colonizing a new planet in our galaxy. You have been chosen to go. Spaceships are now boarding...Write a story about the new colony. Explain who you are and why you were chosen to go. Who went with you and why? What resources did you bring and how did you decide what you would need?



Enough For Everyone? Copyright 1982, Schlitz Audubon Center.

MOVIN' OUT

Activity	Focus	Activity Sheet	Subject Area
People On The Move	Mobility and urban sprawl	X	Social Studies Math
Living In the Fast Lane	Lifestyles/impact of non-biodegradable materials	X	Social Studies Science
The Air We Breathe	Air quality	X	Science
On The Right Track?	Mass transportation Railroads	X	Social Studies Language Arts
Mapping It Up!	City changes over time	X	Social Studies History Math
Land Use Planning for the Future	Land use planning		Science Social Studies
What About the Central City?	Urban renewal	X	Language Arts Social Studies

Movin' Out. Copyright 1982, Schlitz Audubon Center.

MOVIN' OUT

TEACHER INFORMATION

CONCEPTS:

Megalopolis: our cities are spreading out.

Urban sprawl causes air pollution and uses up valuable farmland.

Politics and economics have an impact on land use decisions.

Land use planning, urban renewal, anti-pollution legislation, and mass transportation can all contribute to positive solutions to the megalopolis problems.

Land use patterns have changed drastically since hunters and trappers began the settlement of new territories. Many of our cities had their origins in small trading centers that ballooned into industrial settlements along major transportation routes of rivers and shores. Our cities have undergone a cyclic development beginning with a central core, then spreading out into outlying areas as the central city became more industrialized and less desirable and finally coming full circle, back to the central city as urban renewal attempts to revitalize the inner core. However, urban renewal is in its infancy and urban sprawl continues to digest millions of acres of valuable farmland each year. Competition for land use has become acute as our population continues to expand. Agriculture, housing, recreation, wildlife preservation, industrialization, and transportation are all vying for a slice of our most precious resource: land.

Our cities are spreading out to meet one another as Chicago greets Milwaukee and Detroit; San Francisco greets Los Angeles; and in the east, Washington, D.C., New York, Philadelphia, Baltimore, and Boston are all about to share common boundaries. The result is megalopolis and the problems inherent in urban sprawl. This unit will help your students to examine why cities are spreading out, the problems resulting from urbanization, and some solutions to the problem.

Movin' Out. Copyright 1982, Schlitz Audubon Center.

PEOPLE ON THE MOVE

OBJECTIVE: Students will be able to state the relationship between people's mobility and urban sprawl.

MATERIALS: Activity sheet provided

TIME: One hour class time

Distribute the "People On The Move" activity sheets to your students. Ask them to interview teachers, family members, and people in their neighborhood to find out how far people travel to work and the means of transportation they use. The survey is designed to illustrate how mobile people are and to demonstrate how this mobility has led to urban sprawl. When students have completed their surveys, have them compile their data on a class bulletin board in the form of charts and graphs. Bar graphs, representing the number of people in each category, could be used to illustrate the trends of mobility.

Points for discussion...

Can you make any generalizations about the information you have collected?

How many of the rural dwellers moved to the city?

Did urban dwellers move to the suburbs?

What is the average distance people travel to work?

Do most people take public transportation or drive their own cars?

How many people are in carpools?

How has the automobile changed our work patterns?

LIVING IN THE FAST LANE

OBJECTIVE: Students will percieve a familiar aspect of modern society from an environmentalist point of view.

MATERIALS: Activity sheet provided

TIME: ½ hour class time and short field trip or homework assignment

This activity examines one aspect of our fast-paced lifestyles as well as a characteristic of our spreading cities. Malls and fast food chains are quickly spreading across the land. These "fast food chains" are characteristic of newer areas of cities in all parts of the country. They are also characteristic of our fast moving society. The unfortunate results of this development are the "homogenizing" of our cities (one fast food lane is indistinguishable from another), the deterioration of downtown shopping areas, and the increased energy consumption caused by the packaging from fast food services and energy consumed by private automobiles. You may want to take the class as a group to a fast food restaurant, preferably in an area of town that has a "fast food lane" for this activity. If this is not possible, have them do the activity on their own and report back to the class. The student activity sheet encourages students to take a close look at fast food services, particularly the fast movement and the use of non-biodegradable plastics. Note: additional activities on non-biodegradable materials and recycling are included in the "Enough For Everyone" folder.

THE AIR WE BREATHE

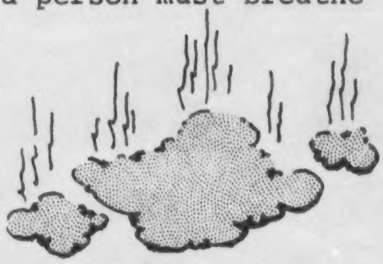
OBJECTIVE: Students will become more aware of air quality in their city and the laws affecting air pollution.

MATERIALS: Activity sheet provided, scissors, string and tape

TIME: Two ½ hour sessions

The sprawl of our cities has been largely due to the accessibility of automobiles. As people commute to the city from their suburban homes in private cars and as the cars converge on the city, the quality of the air in the urban environment declines. There have always been natural pollutants in the air--wind-blown dust, ash, forest and range fires, gases emitted by organic decay, and other natural sources. But humans have contributed considerably to these pollutants-- thousands of tons per day from industrial smokestacks, automotive exhausts, waste incineration, fertilizer and pesticide applications, aerosol sprays, and many other sources. Every day a person must breathe 15,000 quarts of air to stay alive. If the pollutants concentrate, respiratory and heart diseases can increase fatality rates.

In addition, acid rains from the atmosphere polluted by sources hundreds and even thousands of miles away can damage our property and have destructive effects on food and water supplies. These acid



rains are caused by emissions of sulfur and nitrogen oxides, released primarily from the tall stacks of coal-burning power plants, and nitrogen oxides from automobiles. These oxides combine with water vapor in the air to form sulfuric acid or nitric acid and fall to the earth in the form of rain or snow.

The Clean Air Act of 1970 directed the Environmental Protection Agency to develop and achieve acceptable air quality standards. Prior to the 1970 Clear Air Act Amendment, almost 100% of the population in major cities was exposed to particulate concentration greater than the national standard. Significant progress has been made in using cleaner fuels and by putting more controls on industries, thus reducing air pollution from coal-fired power plants and steel mills. However, standards can be relaxed and air pollution still presents a serious problem in our cities.

This activity will stimulate your students to examine the quality of air in your city. Run off copies of the Air We Breathe experiment sheets, on heavy paper if possible, and hand them out to your students. Have each student make their own experiment card from the sheet and then have the class decide where to place the cards. Some of the cards should be placed near busy intersections, on the playground, in vegetation near and away from traffic, on windowsills etc. Leave them out overnight or for a few days and then collect them to examine any materials that have collected. Provide magnifiers or microscopes to examine the sticky surface of the tape. The material which collects will only represent the particulate matter, windblown dust, material from waste incineration, etc. Many of the pollutants in the air, such as carbon monoxide from cars, are not visible.

When the students have examined the cards, discuss any differences they observed in the collection points. Have them relate how they feel about air quality in their city. Find out how much they would be willing to alter their behavior to contribute to cleaner air.

Points for discussion...

Would you be willing to pay more for fuel if it meant cleaner air?

Would you pay more for a car because of pollution control devices?

Would you be willing to walk more often than ask for rides?

What clean air laws now affect our city's air?

Should there be stricter laws?

Movin' Out. Copyright 1982, Schlitz Audubon Center.

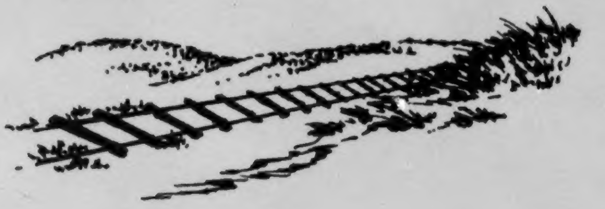
ON THE RIGHT TRACK?

OBJECTIVE: Students will critically examine the issue of cutting back our railroad system and will state their opinion on the issue.

MATERIALS: Activity sheet provided

TIME: One hour

As your students have seen, the automobile has contributed to the spreading of our cities, the pollution of our air and a fast paced lifestyle. Mass transportation provides one alternative. Unfortunately, federal money has been spent almost exclusively on our highway program and has left us with a very poor mass transportation system.



The "Budget Cuts On the Wrong Track" article is one person's opinion on effects of budget cuts on mass transportation. Have your students read the article and answer the reading comprehension questions. Then encourage a discussion of the railroad issue among your students. Students could be watching the newspapers for current articles dealing with mass transportation and articles which present opposing points of view on the railroad issue. Discuss the advantages of mass transportation in terms of saving energy and reducing air pollution. Have students look into local forms of mass transportation as well.

MAPPING IT UP!

OBJECTIVE: Students will become aware of changes in their city's land use patterns over time.

MATERIALS: Old and current maps of your city, colored pencils or markers, and activity sheets provided

TIME: Two 1 hour sessions

This activity is designed to help your students discover how their city has changed over time and to become more aware of the various patterns of land use in your city. Provide some old and current maps of your city and distribute the "Mapping It Up!" activity sheets to your students. If the entire class is working on this activity at one time, you may want to have them work in pairs

Movin' Out. Copyright 1982, Schlitz Audubon Center.

and provide maps for each group. Conduct a class discussion on their findings and reactions to changes that have taken place. The patterns of land use and zoning as a means of regulating land use are explored in the following activity.

Note: To have students calculate the amount of open space in the city have them begin by measuring the dimensions of the city map. Using the map's scale, those dimensions can be converted to square miles and then acres. One square mile = 640 acres. Have them estimate the percentage of open space and then the approximate acreage of open space.

LAND USE PLANNING FOR THE FUTURE

OBJECTIVE: Students will recognize the impact of various land uses on the environment and will become aware of the need for land use planning.

MATERIALS: None

TIME: Two 1 hour sessions

What are some of the impacts on our environment as a result of urban sprawl? As previously mentioned, the accessibility of the automobile is a major factor contributing to urban sprawl which results in increased air pollution. Another major impact on the environment is the loss of farmland and natural areas to housing developments, malls, parking lots etc.

Recognizing the problems inherent in urban sprawl, many cities are now devising land use plans. These plans are designed to regulate the patterns of growth in and around cities through zoning laws. Discuss the concept of land use planning with your class. You could introduce the idea by comparing land use planning with planning a house. Ask your students what would happen if a home were built with no overall plan or blueprint. Various conflicts and expenses would undoubtedly arise. For example, if one began by building a small living room and then built a bedroom in front of it and the traffic later picked up on the street, the bedroom might become too noisy. If all the trees on the land were cut for wood to build the house and the land in front was paved for cars and a garage, the people may later regret the lack of trees for shade and land to enjoy. If a kitchen was built on one end of the house and later a bathroom was added on the other end, the plumbing would be expensive to extend. Conflicts might also arise if the layout of the house was not designed to allow for varying activity levels.

Similarly, lack of city planning results in conflicts if industrial areas or airports are too near residential areas. Plumbing

Movin' Out. Copyright 1982, Schlitz Audubon Center.

and electrical wiring can be compared to city streets. If they aren't well planned, one may waste energy needlessly getting from place to place. In addition, if we continue to pave over our farmlands and natural areas at the present rate, future generations will be deprived of cropland and open spaces.

Ask your class how they might find out if your city has a land use plan. Have the students compose a letter to your city's planning and zoning commission to find out what regulations affect the various uses of land in your area. They may want to compose interview questions and ask a speaker to come to your class. Some interview questions or points for discussion could center around the following:

What factors should be considered when we decide how to use the land? (Should we consider needs of people, needs of wildlife, characteristics of the land, needs of industry, or value of the land for farming?

DEAR MR. CITY PLANNER,
YOURS TRULY

Are some of these factors more important than others?

Which land uses are compatible? Which might conflict?

Does your city have a land use plan? If so, what is the major goal of the plan?

Are there zoning laws to protect farmlands, wetlands and forests? Should there be?

What does each land use pattern do to the environment? (Example: Single-family housing uses lots of land; industry creates noise, congestion and pollution etc.)

What do we lose and what do we gain from zoning regulations? (Individual land owners, like farmers, may lose their freedom to subdivide their land if zoning prevents it, but others may gain since the land remains suitable for growing food.)

If your city has no land use plan, are steps being taken to develop one?

Movin' Out. Copyright 1982, Schlitz Audubon Center.

WHAT ABOUT THE CENTRAL CITY?

OBJECTIVE: Students will examine various viewpoints on the issue of urban renewal.

MATERIALS: Activity sheet provided

TIME: One hour class session plus optional field trip

One means of reversing the trend of urban sprawl is through revitalization of our central cities. From 1950 to 1960 the population of our central cities increased by 9% while the population of suburban areas rose by 48%. As people fled to the suburbs, shopping malls flourished and our inner cities declined. Many neighborhood stores which were readily accessible were often forced to close as shopping malls replaced them. People on fixed or low incomes unable to flee to suburbia were left behind, often in rented homes which were allowed to deteriorate. Today, many cities are taking a second look at their central areas and urban renewal is gaining momentum.

This activity is designed to encourage your students to consider some varying viewpoints on the issue of urban renewal. Students will assume the role of one of various people and write a letter to the editor of the local newspaper expressing their feelings about the proposed closing of downtown shops and businesses to be relocated in a large mall on the edge of the city. (Note: this activity presents a hypothetical situation for your students to respond to. If a similar situation is occurring in your city students should be encouraged to investigate the issue and write letters to the editor of your local newspaper.)

Distribute the activity sheets and explain that as one chooses and develops a role, personal biases should be dropped and the assumed point of view adopted. To make sure all points of view are represented, you may want to check your students' choices before they begin writing. When their "letters" are completed ask volunteers to read their letters to the class. Discuss the pros and cons of the issue with the class and encourage them to form their own point of view.

Find out what your city is doing in the area of urban renewal. Take your class downtown to observe the building or restoration that may be taking place. Have them find out how many stores have closed and moved to malls. They could also examine whether old buildings were being torn down or restored and whether housing in the area was being restored. If your city has a waterfront, visit the area and find out if any restoration is taking place.

Movin' Out. Copyright 1982, Schlitz Audubon Center.

OZAUKEE
COUNTY
MAP
COUNTY
MAP
MILWAUKEE COUNTY

Extensions....

If your museum has a display of your city in the earlier stages of its development, take a class trip to view the display. Discuss the differences in land use patterns then and now.

Conduct a class land use planning session based on the assumption that your city's population will double in the next 20 years.

Have your students write to the Environmental Protection Agency for information on air quality in your city. For the midwest write to:

U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, IL 60604

128

GO THIS WAY
AND THAT WAY
AND THIS WAY

PEOPLE ON THE MOVE

Catch up to some adults on the move and find out how they are getting around. Interview ten people and ask them the following questions. Put an "X" in the column next to their response. Write any of their additional comments on the back of this sheet.

Interview Questions:

	Did you grow up in the city, suburbs or country?			Do you now live in the city, suburbs or country?			How do you travel to work?			How many miles do you travel to work each day? (one way)			
	city	suburbs	country	city	suburbs	country	my car	car pool	mass transportation	0-5	6-10	11-15	more
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													

People walk at about 4 miles per hour. Before we had cars or buses, how far could people live from their jobs if they only wanted to walk for 1/2 hour?

Horse drawn vehicles traveled at about 6 miles per hour. How long would it take a person to go 12 miles to work traveling this way?

Movin' Out. Copyright 1982, Schlitz Audubon Center.

LIVING IN THE FAST LANE

Take a trip to a "fast food" restaurant to find out:

1. Is there a drive-up lane where people can order food from their cars?

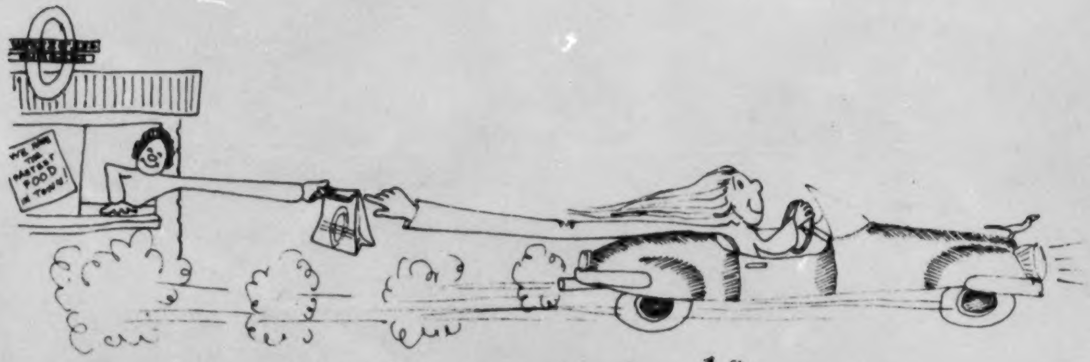
2. Take a look at the clock. Notice what time a customer orders his or her food. How many minutes does it take for the order to be filled? Are people moving fast behind the counter?

3. Are people moving fast in and out of the restaurant? How many minutes do most people stay in the restaurant?

4. Look at the way food is wrapped. Are sandwiches wrapped differently for people who take food out or eat it there? If so, how?

5. Are sandwiches wrapped in styrofoam or paper? Which would be a better wrapper to use? Why?

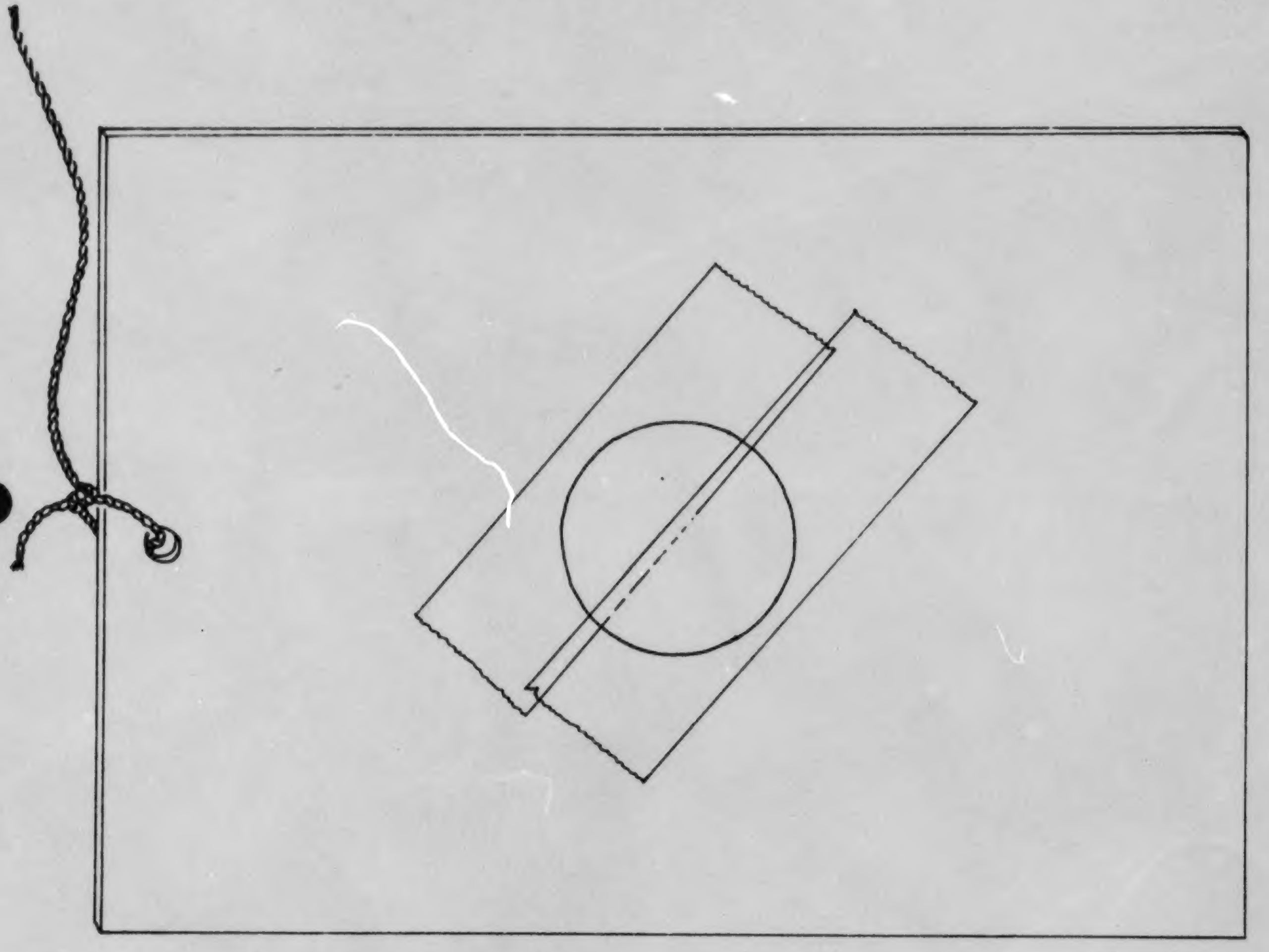
6. List all of the things in the restaurant made from plastic. How many of these items can you find? What happens to plastic when you throw it away?


WE HAVE THE FASTEST FOOD IN TOWN!

THE AIR WE BREATHE

Try this experiment!

Cut out the rectangle and the circle in the middle. Punch a hole in the top and tie a string through it. Use tape to cover the circle in the middle. The sticky surface of the tape will catch some of the pollutants in the air.



You and your classmates should decide where to tie your air pollution experiment cards outside. Put them in different places such as near a busy street, on the school grounds, in some vegetation or wherever you can think of. Leave it out overnight or for a couple of days and then place the tape under a microscope with the sticky side up to see what has collected. Are there differences in the material collected at the different spots?

131

Movin' Out. Copyright 1982, Schlitz Audubon Center.

ON THE RIGHT TRACK?

The article on the reverse side of this sheet is one person's opinion about the railroads in the U.S. Read the article, think about it and answer the following questions.

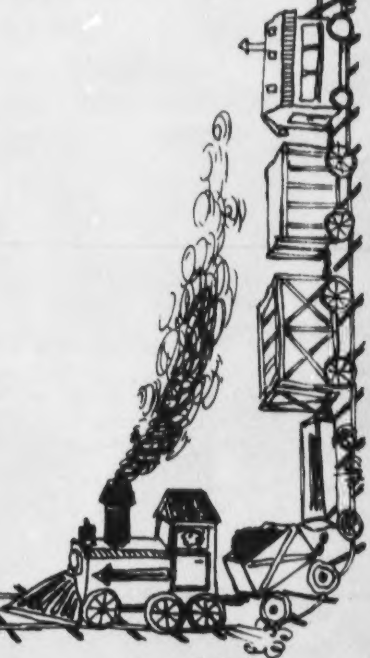
1. What form of transportation gets the best passenger-miles-per-gallon?

2. According to the author of the article, how many people would lose their jobs as a result of these budget cuts in the railroad system?

3. Why would it cost our government $1.5 billion to close down Amtrak?

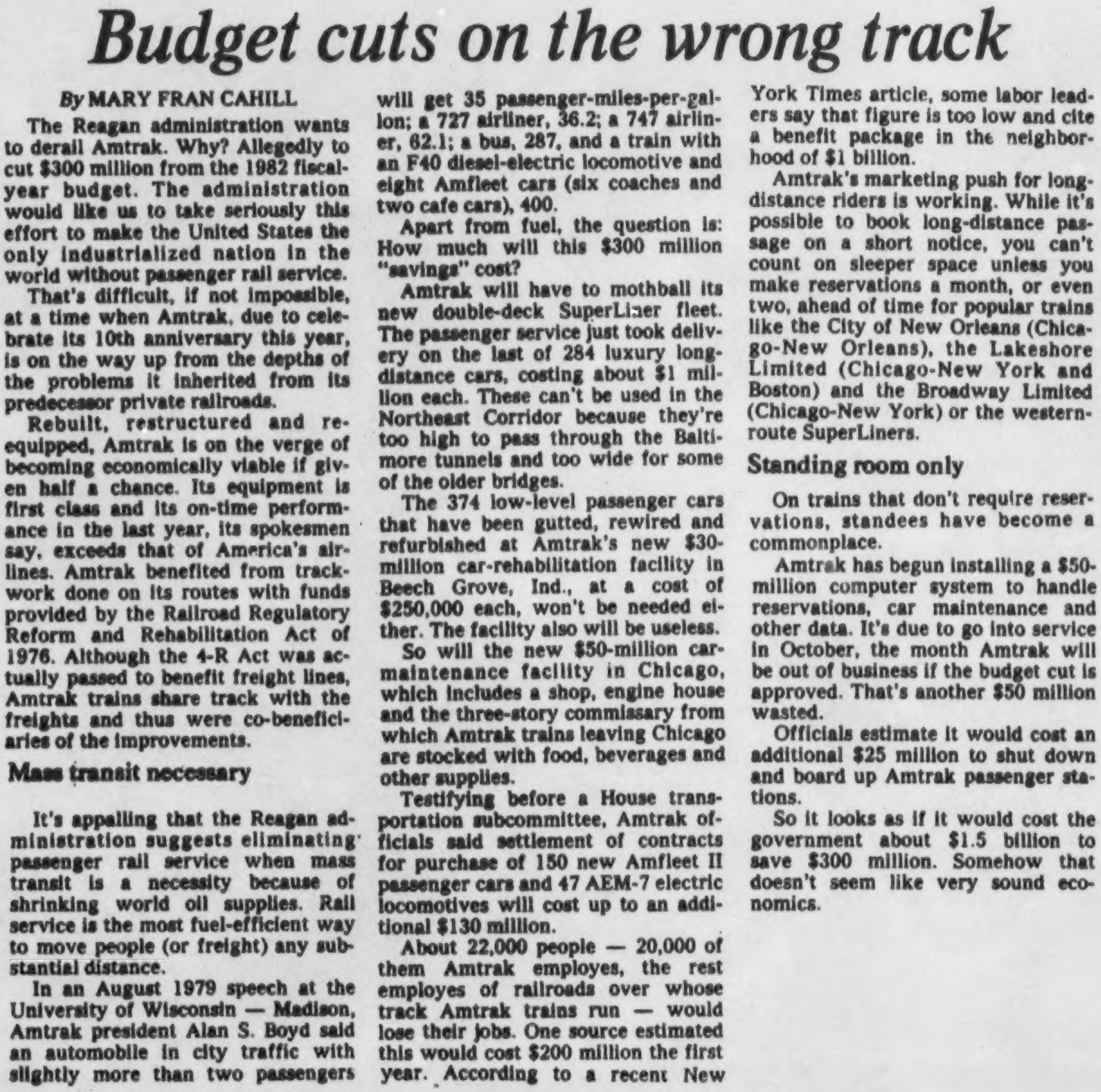
4. Do you think passenger rail service should be done away with? Why or why not?

5. What do you think our government should do?



Movin' Out. **Copyright 1982, Schlitz Audubon Center.**

From The Milwaukee Journal, March 30, 1981



Budget cuts on the wrong track

By MARY FRAN CAHILL

The Reagan administration wants to derail Amtrak. Why? Allegedly to cut $300 million from the 1982 fiscal-year budget. The administration would like us to take seriously this effort to make the United States the only industrialized nation in the world without passenger rail service.

That's difficult, if not impossible, at a time when Amtrak, due to celebrate its 10th anniversary this year, is on the way up from the depths of the problems it inherited from its predecessor private railroads.

Rebuilt, restructured and re-equipped, Amtrak is on the verge of becoming economically viable if given half a chance. Its equipment is first class and its on-time performance in the last year, its spokesmen say, exceeds that of America's airlines. Amtrak benefited from trackwork done on its routes with funds provided by the Railroad Regulatory Reform and Rehabilitation Act of 1976. Although the 4-R Act was actually passed to benefit freight lines, Amtrak trains share track with the freights and thus were co-beneficiaries of the improvements.

Mass transit necessary

It's appalling that the Reagan administration suggests eliminating passenger rail service when mass transit is a necessity because of shrinking world oil supplies. Rail service is the most fuel-efficient way to move people (or freight) any substantial distance.

In an August 1979 speech at the University of Wisconsin — Madison, Amtrak president Alan S. Boyd said an automobile in city traffic with slightly more than two passengers will get 35 passenger-miles-per-gallon; a 727 airliner, 36.2; a 747 airliner, 62.1; a bus, 287, and a train with an F40 diesel-electric locomotive and eight Amfleet cars (six coaches and two cafe cars), 400.

Apart from fuel, the question is: How much will this $300 million "savings" cost?

Amtrak will have to mothball its new double-deck SuperLiner fleet. The passenger service just took delivery on the last of 284 luxury long-distance cars, costing about $1 million each. These can't be used in the Northeast Corridor because they're too high to pass through the Baltimore tunnels and too wide for some of the older bridges.

The 374 low-level passenger cars that have been gutted, rewired and refurbished at Amtrak's new $30-million car-rehabilitation facility in Beech Grove, Ind., at a cost of $250,000 each, won't be needed either. The facility also will be useless.

So will the new $50-million car-maintenance facility in Chicago, which includes a shop, engine house and the three-story commissary from which Amtrak trains leaving Chicago are stocked with food, beverages and other supplies.

Testifying before a House transportation subcommittee, Amtrak officials said settlement of contracts for purchase of 150 new Amfleet II passenger cars and 47 AEM-7 electric locomotives will cost up to an additional $130 million.

About 22,000 people — 20,000 of them Amtrak employes, the rest employes of railroads over whose track Amtrak trains run — would lose their jobs. One source estimated this would cost $200 million the first year. According to a recent New York Times article, some labor leaders say that figure is too low and cite a benefit package in the neighborhood of $1 billion.

Amtrak's marketing push for long-distance riders is working. While it's possible to book long-distance passage on a short notice, you can't count on sleeper space unless you make reservations a month, or even two, ahead of time for popular trains like the City of New Orleans (Chicago-New Orleans), the Lakeshore Limited (Chicago-New York and Boston) and the Broadway Limited (Chicago-New York) or the western-route SuperLiners.

Standing room only

On trains that don't require reservations, standees have become a commonplace.

Amtrak has begun installing a $50-million computer system to handle reservations, car maintenance and other data. It's due to go into service in October, the month Amtrak will be out of business if the budget cut is approved. That's another $50 million wasted.

Officials estimate it would cost an additional $25 million to shut down and board up Amtrak passenger stations.

So it looks as if it would cost the government about $1.5 billion to save $300 million. Somehow that doesn't seem like very sound economics.

Movin' Out. Copyright 1982, Schlitz Audubon Center.

MAPPING IT UP!

Take a close look at some old and new maps of your city. How has your city changed? List all of the changes you can find.

C
H
A
N
G
E
S

Look to see ...

- Are there any open lands or farms still within your city?
- Find the parks on the old and new maps. Do they follow rivers or adjoin lakes? Have new areas been set aside as parks?
- How did highways change your city?

LAND USE PATTERNS

Look at the different ways we use land. The patterns of land use could be defined as: commercial, industrial, open space, residential, highways etc.

Decide on a color to represent each of the current land use patterns in your city. Then color each of these zones in on a current city map.

- Which land uses require the most land?
- Using the scale of the map, see if you can estimate how much open space is within your city.
- What trends can you predict for your city's future based on changes that have taken place in the past?

T
R
E
N
D
S

OZAUKEE
COUNTY
MAP
MILWAUKEE COUNTY

Movin' Out. Copyright 1982, Schlitz Audubon Center.

WHAT ABOUT THE CENTRAL CITY?

FLOWER SHOP
WOOD

The city of Sprawlsville is spreading out. Now two of the major department stores and a number of businesses in the central city are trying to decide if they should close down and move out to a shopping mall proposed to be built on the edge of town. The shopping mall has not yet been approved by the city zoning office and citizens are divided on their views about the mall. The land which developers would like to build on is now farmland and a privately owned woodland totaling 100 acres. The zoning office will soon be making a decision and letters to the editor are pouring in. Some people feel the mall will provide new jobs and be a convenient place to shop. Others feel the central city should be made more attractive to shoppers and businesses and feel the farmland and woods should be protected.

Choose to be one of the following people and write a letter to the editor of the newspaper describing how you feel. (Think: how would the person I've chosen really feel in this situation and present that point of view.) Be sure to list reasons to support your assumed point of view. Check with your classmates to make sure someone is representing each of these people. This will make your class discussion more interesting.

Roles: (Choose one)
Farmer wanting to sell land
Department store owner
Businessperson in downtown area
City dweller for past 80 years
Suburban dweller
Person fond of hiking in woods
Construction company owner
Director of city zoning office
Government official who supports rebuilding downtown

Movin' Out. Copyright 1982, Schlitz Audubon Center.

Dear Editor,

SHIRT FACTORY
GROCERY STORE

WATER WE LOSING?

Activity	Focus	Activity Sheet	Subject Area
Water Dwellers	Contrasting water inhabitants of polluted and non-polluted waterways	X	Science Social Studies
Mini-rivers	Drainage patterns of rivers		Science
Nature's Sponges	Importance of wetlands	Transparency needed	Science Art Social Studies
From the Ground Down	Water percolation through soils and groundwater quality	X	Science Math Language Arts
Going Down	Special nature of topsoil and problem of soil erosion	X	Science Social Studies Math
Water Equality	Cooperation needed to conserve and protect water		Social Studies Language Arts Science

Water We Losing? Copyright 1982, Schlitz Audubon Center.

WATER WE LOSING?

TEACHER INFORMATION

CONCEPTS:

Aquatic organisms are adversely affected by water pollution.

We are losing wetlands which purify our water, provide flood protection, and replenish water supplies.

Our groundwater can be contaminated for years by materials we apply to and discard upon the land.

Topsoil is a valuable resource that is eroding from our land.

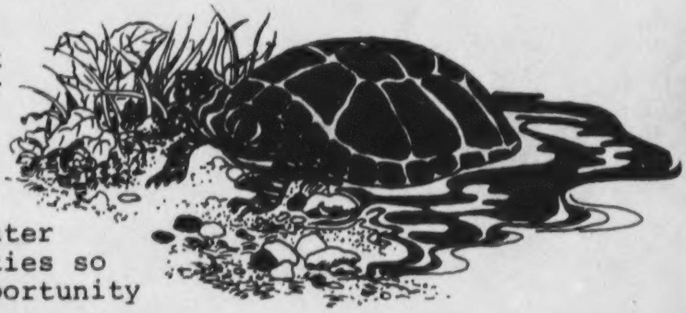
Individuals, industries, and nations need to cooperate to conserve water and protect water quality.

WATER DWELLERS

OBJECTIVE:	Students will compare the water quality and the inhabitants of a non-polluted waterway with a polluted one.
MATERIALS:	Activity Sheets provided; water test kits, dip nets, white bottomed containers, thermometers.
TIME:	One day field experience

Before your students can really understand the impact of water pollution, they should have the opportunity to investigate the inhabitants of a pond or river in a natural area. If your students have the opportunity to investigate a healthy aquatic environment in terms of the diversity of life there and the quality of the water, they will perhaps have a clearer understanding of what we are losing as our waterways decline in quality.

Contact a nature center or park in your area to arrange a water study field trip. They will probably have dip nets, field guides, and water quality test kits available as well as personnel to assist you in a water study. Plan your day's activities so that students will have the opportunity



Water We Losing? Copyright 1982, Schlitz Audubon Center.

to compare and contrast the inhabitants and water quality of a non-polluted river or pond with a polluted one. Students should note differences in the two areas such as the plants or animals that can withstand the polluted conditions, the quality of the water, etc. Students will be aware of the obvious forms of pollution such as the litter in the water and along the banks. Other sources of water pollution which may not appear so obvious are the nitrates from sewage and phosphates from detergents we use. Simple tests can be conducted to test for levels of these chemicals in the water. Ask the nature center staff for assistance. Nitrates and phosphates will cause algae to grow. As the excessive algae growth begins to decompose, it depletes the oxygen supply in the water, which in turn affects the animals living there. Toxic chemical wastes also seriously affect water quality. Students should investigate whether any industries are located along rivers in your area and if any toxic wastes are being discharged into the rivers.

MINI-RIVERS

OBJECTIVE:	Students will become familiar with the drainage patterns of rivers.
MATERIALS:	None
TIME:	One hour

It is difficult to visualize a river system when standing on the banks of one tributary or large river. Take advantage of the rain on your school grounds some day to help your students visualize how a river system works. The flow of water on a clay area or along the side of the street will serve the purpose well. Have students locate the main flow of water or "mini-river" and then look for the tributaries which feed it. How many tributaries can they find? Can they find slow moving and fast moving streams? Are they different in color, indicating sediment load? Will a fast moving or slow moving stream carry more water?

Are there any miniature waterfalls, dams, or deltas? If not, can they create them? They could build their own mini-dams using rocks and observe what happens "upstream." Is there a lake forming behind the dam? How long before it will silt in? Is the watershed or land that the water is flowing from, covered with grass, bare soil, or cement? How does the ground cover affect the water

140

Water We Losing? Copyright 1982, Schlitz Audubon Center.

quality? If the area is bare soil, will the soil be eroding into the newly formed lake? Notice how the water soaks into the grassy areas. How can these be compared to wetlands in nature which hold water?

Discuss how the drainage of water in the city is affected by the ground surface. What is our rainwater flowing over? Note that the water will pick up materials such as salts, oils, and other refuse and carry it into our sewers. Where will this water end up?

When you return to the classroom, have your students examine a map depicting the drainage patterns of waterways in your area. Locate the streams near the school or in their neighborhood. Then trace the flow of water into larger rivers and find where these rivers flow. Locate dams in the area and see how they affect the flow of water. The students will probably be concerned about the quality of water in their rivers. They should find out what legislation has been passed to protect water in your area. The federal Clean Water Act Amendments of 1977 set goals to improve water quality by 1983. Permits are now required for all point source pollutants. Students should write to the Environmental Protection Agency in your region. They will send maps depicting water quality of rivers and lakes and the latest information on water quality in their "Profile of Environmental Quality."

NATURE'S SPONGES

OBJECTIVE:	Students will percieve the importance of wetlands in controlling flooding and purifying and replenishing water supplies.
MATERIALS:	Transparency needed, modeling clay, sponges sticks, Q-tips, glue, scissors, brown paint.
TIME:	Two - three hours

Our wetlands are nature's sponges. Unfortunately their importance in controlling flooding and replenishing and purifying our water, not to mention the habitat they provide, has not been widely recognized. These wet, marshy areas were viewed by many as wastelands which could best be utilized by draining them. As a result, many of them are gone. In Wisconsin alone, 10 million acres of these "natural sponges" have been reduced to 2.5 million acres today.

Ask your students to think about the

141

Water We Losing? Copyright 1982, Schlitz Audubon Center.

condition of a grassy field after a rain or when the snow melts in the spring. They will recall the soggy ground beneath their feet. Ask if anyone has ever visited a marsh or wetland. See if they can think of any reasons why these areas should be left in their natural state. Do they have suggestions on how we should "use" these lands?

To help them discover the important role of wetlands, have them build a mini-environment modeled after the example on the transparency. Go over the transparency and discuss some of the functions of wetlands. Use modeling clay to build the terrain. Then have them cut and glue a thin layer of sponges onto the surface of the land, except on the wetland. They could use sticks and pieces of green sponge to make trees and Q-tips colored brown for cattails. Have them make a "removable marsh" out of a thick piece of sponge to be inserted into the wetland depression. Be sure they don't glue this in place!

When they have completed the model have them place the removable marsh in the depression and pour water onto the model at the point furthest from the lake. Watch how the "ground" absorbs the water and how the lake or stream slowly fills in. Now "drain" the wetland by removing the sponge. What happens when water is poured onto the model? How fast does the lake fill in? Pour on a good volume of water. Does the lake or stream "flood?" Is any water stored in the wetland depression for release later on? Now place the "wetland" back in the depression. Pour muddy water onto the model. What color is the water coming out into the lake? What happens when the wetland is removed. Should wetlands in nature be protected?

FROM THE GROUND DOWN

OBJECTIVE:	Students will become aware of the various rates of percolation of water through soils and realize that ground water can be contaminated by materials from the land surface.
MATERIALS:	4 tin cans, watch with second hand, and student activity sheet provided
TIME:	One hour

Ninety-five percent of the Earth's water is in our seas. The remaining five percent is fresh water, but four percent of that is frozen in the Earth's polar regions. That leaves one percent for our "use." Of that one percent 98% is in ground water. Ground water is located in impermeable layers of clay or rock or in porous sand or gravel beneath the soil. This ground water moves very slowly beneath the surface, sometimes traveling only a few feet each year. If these underground water supplies are contaminated by gasoline, nitrates, pesticides, or other chemicals, they may remain polluted for generations to come. Unfortuantely these pollutants are showing up in contaminated wells around the country.

This activity is designed to raise your students' awareness of how materials applied to or discarded on the land can percolate down to ground water supplies. Remove the tops and bottoms from three equal-sized tin cans. Make a mark ½ inch from the bottom rim on each can. These cans will then be pressed into the soil up to that mark in three different areas.

Distribute the student activity sheets to your class and discuss the meaning of "percolation." Have them recall the brewing of coffee and the percolation of water through the grains. Take your class outside and ask them to locate three areas that might absorb water at different rates. Try placing the cans in a sandy soil (is there a sand box?), a grassy lawn and in a compacted, heavily used path. Use the fourth can to pour water into each of the cans and start timing the rate of absorption as soon as you start to pour the water. Stop timing when no more water remains in the can. It may take a long time for some of the soils to absorb water. Ask students to predict which soil will absorb water most quickly. You may need to come back later and check the water percolation in the clay soil. It could take some time.

Discuss the results with the class. Ask where the water is going when it enters the ground. Talk about ground water beneath the ground and compare it to a very slow moving stream. Recall the example of percolating coffee and discuss the problem of pollutants percolating down through the soil. Have students investigate the quality of your areas' ground water. Are there any towns where ground water has been contaminated? What can be done to protect ground water? Compose a class letter to one of your state legislators to find out what laws have been enacted to protect your ground water.

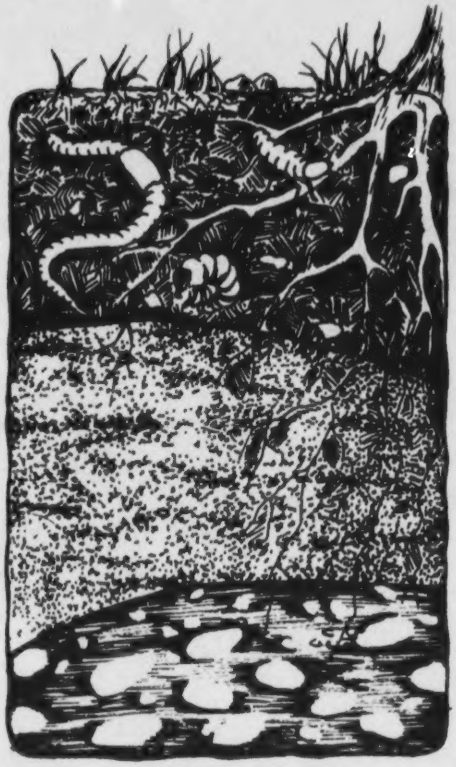
GOING DOWN

OBJECTIVE:	Students will become more aware of the special nature of topsoil and its loss through soil erosion.
MATERIALS:	Student activity sheets provided, two clay pots, clay, topsiol and corn seeds
TIME:	One hour initial sesson and intermittent follow-up

Water We Losing? Copyright 1982, Schlitz Audubon Center.

We have taken the life-giving properties of our topsoil for granted as we've let it wash away into our rivers and streams. To many children, especially the urban youngsters, topsoil is dirt. What is special about it? Why should we worry about hanging onto it?

This activity is divided into two sections to help your students gain an appreciation for the value of topsoil. Students should first conduct an investigation into the nature of topsoil by examining its texture and some of the life in it. They should compare its life-giving qualities to subsoil and then look into the problem of soil erosion.

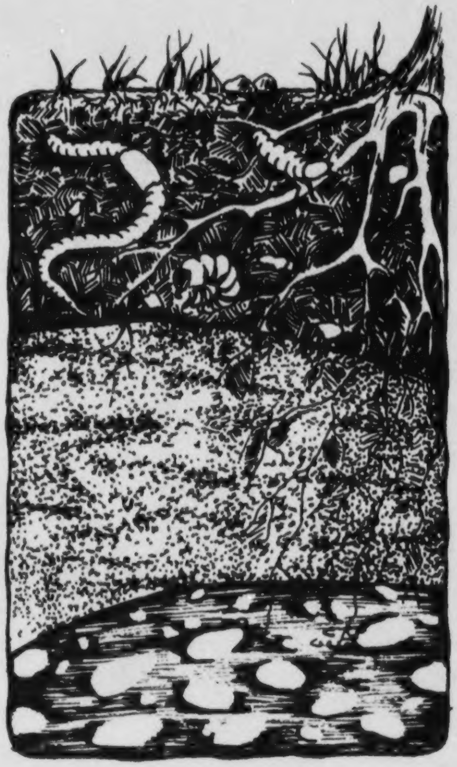


Distribute the student activity sheets and take your students outside to investigate topsoils and subsoils. Find an exposed bank for them to investigate or dig out an area for them to see a soil profile. You might want to contact a nature center naturalist to assist you in this venture. The nature center might have soil probes to extract small soil samples allowing your students to view the layering of topsils over subsoil. Have them compare the color, texture, and "inhabitants" of the topsoil and subsoil.

If the topsoil is much lighter in texture than the subsoil, place a sample of each in a six-inch clay pot. If it is not significantly different, use commercial potting soil for the topsoil. Have students plant a few corn seeds in each pot, water them, and put them in a sunny window. Check the pots each day, making sure to keep the soil moist. What happens to the seeds? Can plants grow as well in subsoil? Why not? (Subsoil lacks organic matter which provides nutrients and air space allowing the plant to grow.) What are the implications here if we allow our topsoil to erode? Discuss the problem of soil erosion with your class. Have them think about the math questions on the student activity sheets. Do they think soil erosion is a serious problem? Should people in the city be concerned about it? What can we do to prevent soil erosion?

We have taken the life-giving properties of our topsoil for granted as we've let it wash away into our rivers and streams. To many children, especially the urban youngsters, topsoil is dirt. What is special about it? Why should we worry about hanging onto it?

This activity is divided into two sections to help your students gain an appreciation for the value of topsoil. Students should first conduct an investigation into the nature of topsoil by examining its texture and some of the life in it. They should compare its life-giving qualities to subsoil and then look into the problem of soil erosion.



Distribute the student activity sheets and take your students outside to investigate topsoils and subsoils. Find an exposed bank for them to investigate or dig out an area for them to see a soil profile. You might want to contact a nature center naturalist to assist you in this venture. The nature center might have soil probes to extract small soil samples allowing your students to view the layering of topsils over subsoil. Have them compare the color, texture, and "inhabitants" of the topsoil and subsoil.

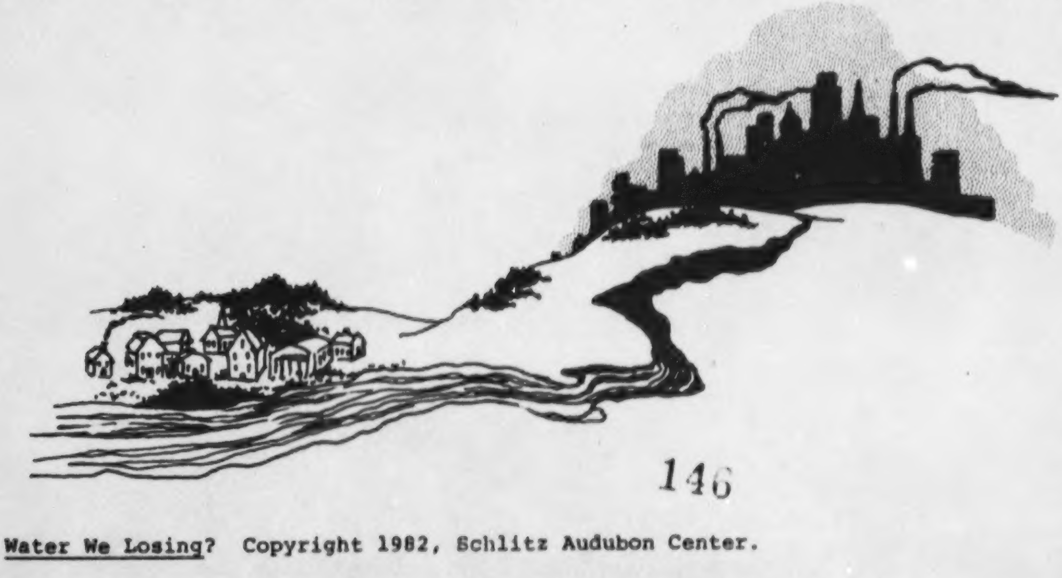
If the topsoil is much lighter in texture than the subsoil, place a sample of each in a six-inch clay pot. If it is not significantly different, use commercial potting soil for the topsoil. Have students plant a few corn seeds in each pot, water them, and put them in a sunny window. Check the pots each day, making sure to keep the soil moist. What happens to the seeds? Can plants grow as well in subsoil? Why not? (Subsoil lacks organic matter which provides nutrients and air space allowing the plant to grow.) What are the implications here if we allow our topsoil to erode? Discuss the problem of soil erosion with your class. Have them think about the math questions on the student activity sheets. Do they think soil erosion is a serious problem? Should people in the city be concerned about it? What can we do to prevent soil erosion?

WATER EQUALITY

OBJECTIVE: Students will reflect on the need for cooperation among individuals, industries, and nations to conserve water and protect water quality.
MATERIALS: None
TIME: Dependent on students' level of interest

Water on our Earth does not recognize national boundaries, nor does it recognize the rights of individual use vs. industrial use. It flows continually through the hydrologic cycle and we step in to dam it, straighten it, flush our wastes with it, drink it, and generally use it as we see fit. People may differ on their assessment of our water pollution problems, but most will agree that water quality should be protected. Who should protect it and how is a complex question. Water conservation is another vital issue. As our population continues to grow, the demand on water supplies and the impact on water quality will grow with it. The Global 2000 Report predicts increases of 200-300 percent in the withdrawal of water for global use between 1975 and 2000.

Discuss the problem of water pollution and water conservation with your class. Divide the class into three research teams. Their tasks will be to find examples of people cooperating to conserve and protect water. One team should investigate cooperation among towns or cities. Another should investigate cooperation between industries and individuals or industries and government. The third team should look for examples of cooperations between nations (for example, the cooperative effort between Canada and the United States to clean up the Great Lakes.) Their search may take them to the library, to local industries using water, and to government officials. They may want to compose letters to various industries and government agencies requesting information to help them in their investigation. Have them write up a report and share their findings with each other.



Water We Losing? Copyright 1982, Schlitz Audubon Center.

Extensions.....

Take your class to visit a wetland.

Interview a farmer about soil erosion controls and the problems of implementing them.

Investigate the effect of local dams on the area. Examine their benefits and drawbacks and draw some conclusions.

Look into some of the creative solutions which have been devised to deal with the water borne sewage problem. For example, there are composting toilets (Sweden has a good design) which turn sewage and kitchen waste into garden compost.

For additional information:

Save the Earth Handbook For Kids
Betty Miles
(has example of cooperation on water clean up)

Water, The Essential Resource
Philip W. Quigg
National Audubon Society
950 Third Avenue
New York, NY 10022

Educator's Guide to Great Lakes Materials
Pam Johnson
University of Wisconsin Sea Grant College Program
1800 University Avenue
Madison, WI 53706

U.S. Environmental Protection Agency
Region V
230 S. Dearborn Street
Chicago, IL 60604

International Joint Commission
Great Lakes Water Quality Board
Regional Office
Suite 800
100 Ouellette Avenue
Windsor, Ontario N9ACT3

What Is Happening To Our Water?
Peter L. Sullivan
National Wildlife Federation
1412 16th Street, NW
Washington, D.C. 20036
(single copies free)

WATER DWELLERS

CLEAN STREAM

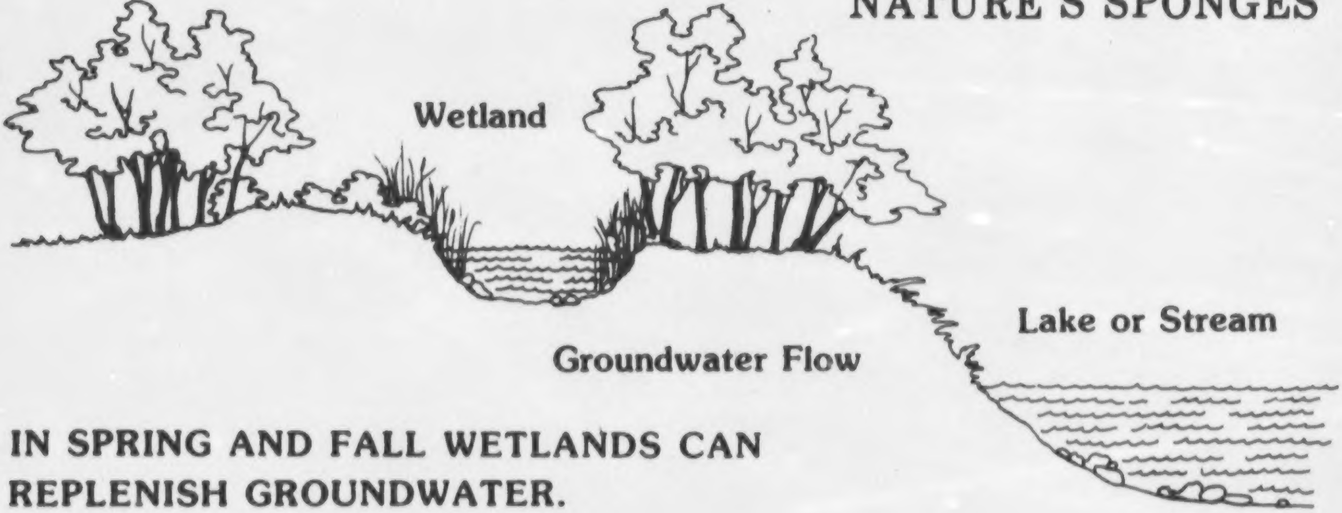
Temperature:
Water Color:
Who lives there?

POLLUTED STREAM

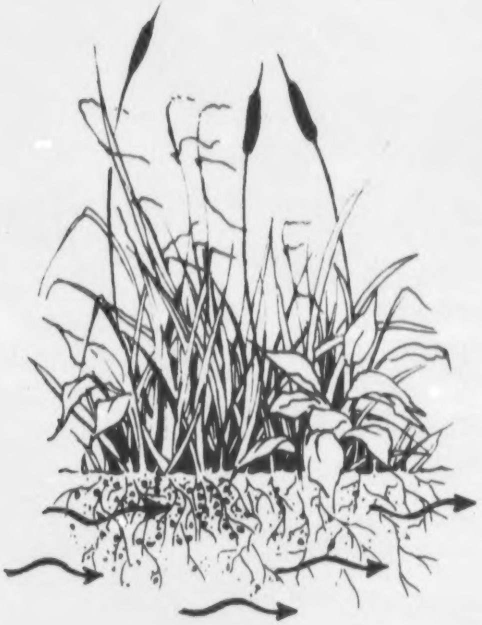
Temperature:
Water Color:
Who lives there?

Water We Losing? Copyright 1982, Schlitz Audubon Center.

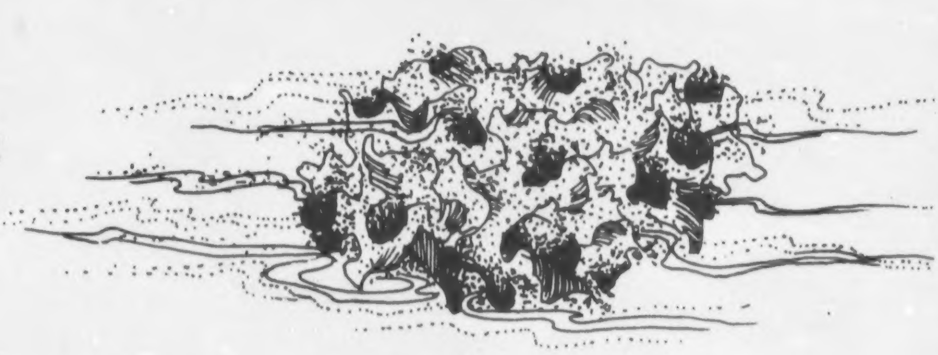
NATURE'S SPONGES


Wetland
Lake or Stream
Groundwater Flow

IN SPRING AND FALL WETLANDS CAN REPLENISH GROUNDWATER.



WETLANDS FILTER IMPURITIES



AND STORE WATER LIKE A SPONGE.

TRANSPARENCY

FROM THE GROUND DOWN

Try a water percolation test to find out how quickly water moves through different soils. Remove the tops and bottoms from 3 tin cans of the same size. Press them into 3 different soils and see how fast the water percolates down.

Prediction:

I predict the water will drain first through the soil in the ________________ area.

Test site	Start time	Finish time	Total "perc" time
Grassy area			
Sandy area			
Compacted area			

Was your prediction correct?

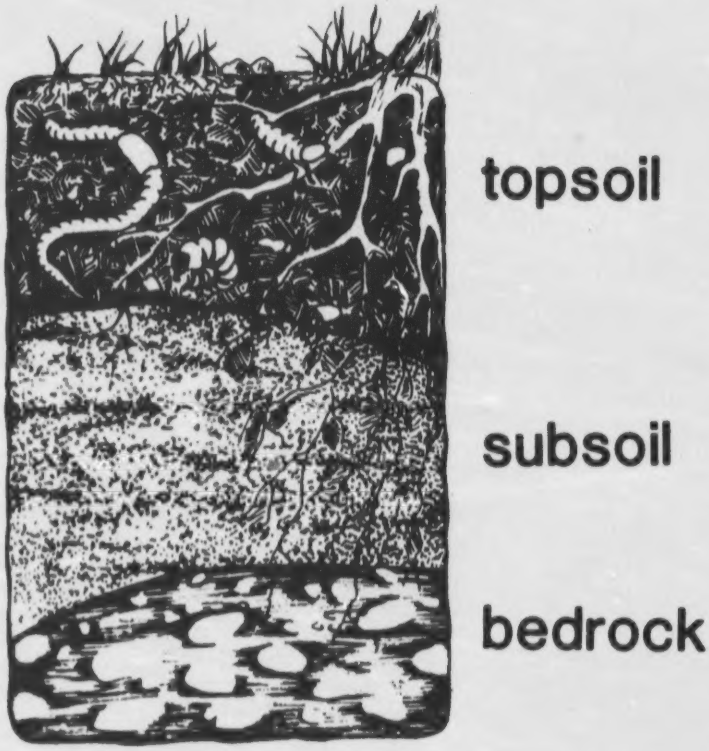
Where does the water go when it enters the ground?

What is "groundwater"? Does it need to be protected? Why or why not?

Write to your state legislator and find out what laws protect the groundwater in your state.

Water We Losing? Copyright 1982, Schlitz Audubon Center.

GOING DOWN



Go outside and take a closer look at the ground you walk on every day. Look at a soil profile or a side view of the soil. Can you find the line between the topsoil and subsoil? Can you find where the bedrock starts?

Topsoil is formed when plants and animals decay and add their wastes to the soil. Feel it and feel the subsoil. Look for all the differences you can find and record them below:

	Topsoil	Subsoil
Color:		
Texture:		
Living Things:		

Take some samples of topsoil and subsoil back to the classroom. Try planting corn seeds in each sample. What happens?

Water We Losing? Copyright 1982, Schlitz Audubon Center.

Soil Puzzlers:

Topsoil is more than just dirt. We need it to grow the food we eat. Right now it is eroding or washing and blowing off our farmlands into ditches and rivers. Where will we get more topsoil?

It takes nature anywhere from 250 to 2000 years to make one inch of topsoil. In some places we have already lost 1 foot of topsoil. How long will it take nature to replace it?

We have already lost 1/3 of our topsoil in the last 200 years in the United States. If we continue to lose topsoil at this rate, how long will it be before all the topsoil is gone?

More than 4 billion tons of soil are eroded from the nation's farms each year! This would be enough soil to fill a huge hole 1 mile square and 6 miles deep. How many feet are in a mile? How many city blocks make up a mile?

How many 100's in a million? In a billion? Do you think we should be concerned about soil erosion?

Water We Losing? Copyright 1982, Schlitz Audubon Center.

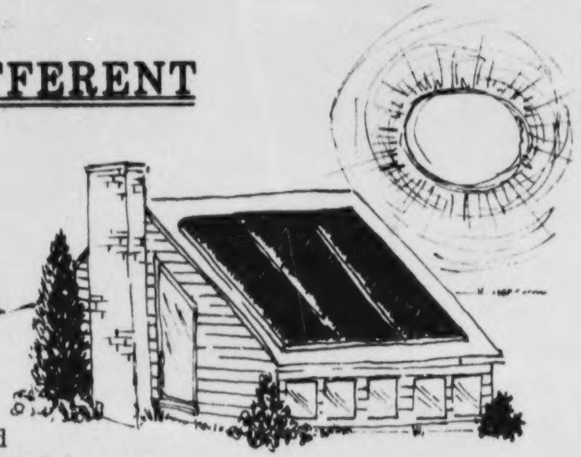
THINGS COULD BE DIFFERENT

Activity	Focus	Activity Sheet	Subject Area
Native American Time Line	History of Native American cultures in contrast to today	x	History Math
A Woodland Visit	Woodland appreciation and Native American philosophy		Language Arts Science History
From the Farm to My Table	Use of energy in food production and processing	Transparency needed	Science Social Studies
Shoppin' At the Co-op	Food cooperatives	x	Social Studies
Finding Out About Fibers	Production of synthetic and natural fibers	x	Science Social Studies
Sunshine Energy	Energy from the sun		Science Social Studies
Mother Earth	Living in harmony with the Earth		Art Science Language Arts

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

THINGS COULD BE DIFFERENT

TEACHER INFORMATION



CONCEPTS:

Native Americans lived in harmony with the land.

People today still depend on the Earth for food, clothing and energy supplies, but have learned to synthesize raw materials into unnatural forms.

Food processing is energy intensive.

The sun's energy can be captured to provide a clean, renewable source of energy.

People have a responsibility to try to live in harmony with the land.

Things could be different from what they are. Our relationship with our Earth could be much more harmonious. We don't need to be losing our topsoil to the seas or scarring the land in so many ways. People are beginning to sit up and take notice and demand clean air and water. But, we need to do more than that. We need to take a closer look at our own lifestyles as well. What can we, as individuals, do to contribute to a healthier environment?

This unit begins with an investigation of the way things used to be by looking into the Native Americans' lifestyle. The Native American philosophy of life was centered around their close relationship to the land. The kinship they felt for the Earth and the plants and animals that shared the land with them was evident in their expressions, "Mother Earth" and "Father Sky". These Native Americans migrated across the Bering land bridge to Alaska during the Pleistocene ice age when massive glaciers locked up much of the world's water in ice. Archeologic evidence indicates that these people probably arrived in the new world about 20,000 years ago. The earliest people were nomadic, following herds of large roaming animals. More sedentary lifestyles evolved as people grew less dependent on hunting, and more reliant on agriculture as a way of life. This investigation of the Native Americans emphasizes their lifestyles as a basis of comparison for lifestyles in our present culture. A description of some of the cultures that evolved is provided in the "time line" activity which follows.

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

NATIVE AMERICAN TIMELINE

OBJECTIVE:	Students will percieve the amount of time that has elapsed between the development of various Native American cultures in relation to the development of our culture today.
MATERIALS:	170 feet of twine, 1/4 yard of light colored fabric, measuring tape, marking pens and stapler
TIME:	Two 45-minute sessions

It is difficult to conceptualize the number of years that the Native Americans lived on this continent in relation to its more recent colonization. This activity combines history and math to help your students learn about some of the basic Indian cultures and the history of their development in North America. The time line will be a scaled representation of the development of the Paleo, Archaic, Woodland and Oneota cultures leading up to the present day. The Paleo and Archaic cultures are representative of most of our country from 3,000 to 12,000 years ago. The Woodland culture was primarily in the eastern half of the country and the Oneota culture was primarily midwestern. Students could do some research to find out which Native American tribes were indigenous to your area in its more recent history.

Begin this activity with a discussion of the Native Americans. Who were they? How was their lifestyle different from ours? How long ago did they live here? Tell your students they are going to take a walk back in time to learn more about the Native Americans. To do this, they will need to make a time line. You may want to construct the line out on your school grounds to allow adequate space.

Distribute the student activity sheets and discuss the scale. (1 foot equals 120 years.) Encourage them to figure out the distance between points on the time line in feet. If the distance between each culture is rounded off to the nearest foot, the line would be set up as follows:

167 feet between 20,000 years ago and the Paleo Indians
100 feet to the Archaic culture
71 feet to the Woodland culture
25 feet to the Oneota culture
8 feet to settlement of U.S. roughly 200 years ago
2 feet from settlement to today

Assign tasks to groups of students for construction of the time line. Some students could cut squares from the fabric, others could be labelers and others could be measurers and fasteners. When the line is complete, set it up on the school grounds and begin your walk back in time. Stop at each tag and discuss the major differences in cultures. (Additional information on cultures is included on the student activity sheet.) Students should percieve the relationship of agriculture to more sedentary lifestyles.

157

They should also become more aware of the large amount of time that the Native Americans lived in the U.S. in relation to more recent settlement. It is interesting to reflect on this time span. What impact did the Native Americans have on the land in 20,000 years? What impact have we had on the land in the last 200 years?

A WOODLAND VISIT

OBJECTIVE: Students will develop an appreciation for Native American lifestyles as well as an appreciation for part of their natural heritage.
MATERIALS: Notebooks, pencils (and Native American artifacts, if you can locate some)
TIME: Spend the day if you can.

Contact a local nature center or park to arrange a visit to a forest. Set the theme of the day's activities as visiting the kind of place where Native Americans once lived. Topics for exploration should include native foods, clothing and shelter as well as the philosophy of the Native Americans. Try to locate a local historian who might have artifacts and information on tribes in your area to participate in this class outing. You might then begin the day with a brief historical account of local tribes and a review of some of the tools they used to fashion their existence in the area.

You will want to consult with the naturalist at the nature center or park to arrange your day's activities. Below are some suggestions for helping your students appreciate Native American lifestyles in a woodland setting.

Woodland Survival

Ask your students to imagine what it might be like to survive in the forest if they were to live off the land entirely. What kinds of foods can be found in the woods? What kinds of shelters could be made? What tools could be made by hand from natural materials? Take a walk through the forest with a Naturalist and look for some of the wild edible foods which the Native Americans relied on. The roots of plants like spring beauty, trout lily, and soloman's seal were a source of food. Many berries were also food sources such as gooseberries, elderberries, juneberries and wild strawberries. Some of these berries were also used as dyes on baskets and clothing. Wild rice was gathered from canoes in some parts of the country and was stored in birchbark bags to last through the winter.

All parts of the hunted animals were used. In addition to the meat for food, bones were used for tools, sinews for thread and the bladder for jugs. The hides provided clothes, shoes, rope and shelter. Shelters were fashioned from young sapling trees and hides. Tools were also made from rocks and wood. Students are usually impressed by the primitiveness of the tools. But, ask them if they could fashion a projectile point from rock.

Woodland Reflection

Many of your students have probably never had the opportunity to sit alone in the woods and tune into the sounds and sights around them. Set the tone of this activity as a quiet, reflective time to enjoy the peaceful aspects of the woods and express thoughts about living in a woodland environment. To help set this tone, you may want to read the following quote from Chief Luther Standing Bear. He speaks of the Lakota tribe of the western plains, now known as the Sioux. Have students sit on the ground as you read.

> "The Lakota was a true naturist - a lover of nature. He loved the earth and all things of the earth, the attachment growing with age. The old people came literally to love the soil and they sat or reclined on the ground with a feeling of being close to a mothering power. It was good for the skin to touch the earth and the old people liked to remove their moccasins and walk with bare feet on the sacred earth. Their tipis were built upon the earth and their altars were made of earth. The birds that flew in the air came to rest upon the earth and it was the final abiding place of all things that lived and grew. The soil was soothing, strengthening, cleansing and healing."
>
> "That is why the old Indian still sits upon the earth instead of propping himself up and away from its life-giving forces. For him, to sit or lie upon the ground is to be able to think more deeply and to feel more keenly; he can see more clearly into the mysteries of life and come closer in kinship to other lives about him..."
>
> "Kinship with all creatures of the earth, sky and water was a real and active principle. For the animal and bird world there existed a brotherly feeling that kept the Lakota safe among them and so close did some of the Lakotas come to their feathered and furred friends that in true brotherhood they spoke a common tongue."

> "The old Lakota was wise. He knew that man's heart away from nature becomes hard; he knew that lack of respect for growing, living things soon led to lack of respect for humans too. So he kept his youth close to its softening influence."

To help your students stay with you as you are reading, you might want to stop and ask questions or clarify. For example, it may help to clarify terms like "kinship" and discuss this relationship to other creatures.

Have each student bring along a notebook and pencil and walk along a nature trail and silently drop your students off one at a time. Try to space them so that they are not in view of one another. Ask them to settle into their places and then write their feelings about living in a woodland environment. They could begin with the statement: "If I woke up 3,000 years ago..." Allow 15 to 20 minutes of reflective time and then walk back down the trail, quietly picking up each student. Reassemble, in the woods if possible, and have students discuss their reflections. Did they find the woods frightening or comforting? How would the Native Americans have percieved the forest? What can we learn from the study of Native American culture that would be useful to us today?

When you return to school, have your students find out about the status of forests in your region. How much forest land has been cleared in the last 200 years? What conservation efforts are being made? What can your students do to contribute to conservation efforts? Discuss possibilities for informing others, writing letters to legislators supporting conservation of forests, and recycling paper products.

The Native American lifestyles present a sharp contrast to our present way of life. Our technology has given us the ability to extract natural materials from the Earth and change them through chemical processes into synthetic forms. Chemical additives are being used to preserve and color foods; and natural fibers have been replaced by synthetic fibers. Our ability to extract non-renewable fossil fuels from the Earth has led to our reliance on fossil fuels for our way of life and as our lifestyles become further removed from nature, we lose track of our relationship to the Earth. The remainder of this unit deals with living in harmony with the Earth.

FROM THE FARM TO MY TABLE

OBJECTIVE: Students will examine the energy intensive steps involved in food processing.
MATERIALS: Transparency needed
TIME: One hour, which could lead into a long range project.

Much attention has been drawn to our use of processed foods. As presented in the "Less Is More" packet, our over-use of packaging wastes resources and energy. The processing of foods is also energy intensive. Ask students to individually list all of the different steps involved in getting corn from the farm to their home in a frozen package. When they've had time to think about it and share their answers, use a transparency to discuss the steps involved in processing corn.

Some ideas for discussion: Are there any other steps involved? Can you think of ways to save some of these steps? What if you grow your own? Discuss the energy use involved in each of these steps. Oil is used to run the tractor and petroleum-based fertilizers and pesticides are used to grow corn. Oil and gas are used to run the trucks. Electricity is used to keep the corn frozen. Gas is used when we drive to the store. Electricity is used to run our refrigerators and electricity or gas is used to cook the corn. The disposal of the discarded package also involves energy as it is transported to the landfill and finally buried.

For further discussion, have students trace the steps involved when corn is used as livestock feed. They could investigate all the steps involved from the corn being fed to livestock to the ultimate product of meat on the table.

One obvious way to save some energy steps is to grow your own! If you have land available, start a school garden project. You will need parental involvement to carry the garden through the summer months, but don't let it deter you. Involving children with a garden is a tremendous way of promoting self-sufficiency, improved nutrition and appreciation for our dependence upon the land for survival.

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

SHOPPIN' AT THE CO-OP

OBJECTIVE: Students will examine the concept of cooperatives and visit a food cooperative to observe the distribution of less processed foods.
MATERIALS: Activity sheet provided
TIME: Two to three hours

Ask your students to define "cooperation". Find out if anyone is aware of "cooperatives" in the form of farm cooperatives or food cooperatives. Explain that food cooperatives are food stores with members. Many of these stores are jointly owned by the people that shop there. They usually sell rice, flour, nuts, grains, and produce in bulk, displayed in large bins. People bring their own containers when they shop which helps to save packaging.

Arrange a class trip to a food co-op in your city. Call the co-op to request a guided tour or to simply arrange a visit. Distribute the activity sheets and review the questions with your students. Some of the questions should be answered when they return from the trip. Discuss their responses and reactions when you return to the classroom. You may want to reinforce the idea of cooperatives by setting up some classroom cooperatives dealing with sharing of student's resources or ideas.

FINDING OUT ABOUT FIBERS

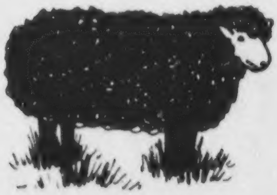
OBJECTIVE: Students will investigate the source of fibers in their clothing and the impact of the fibers on the environment.
MATERIALS: Activity sheet provided
TIME: Two 1-hour sessions

Natural materials like cotton and wool have been considerably displaced by synthetic ones. The per capita consumption of synthetic fibers has risen dramatically since 1950 while the use of cotton and wool has dropped.

To produce fibers, whether natural or synthetic, both raw materials and a source of energy are required. The energy required to form cotton fibers is taken up by the cotton plant from a free, renewable resource - sunlight. The energy needed to form wool is obtained from the sheep's food, which is in turn derived from sunlight. However, the production of cotton and food for the sheep involves the use of petroleum-based fertilizers and pesticides and often the loss of soil through erosion.

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

The energy required to produce synthetic fibers comes from raw materials, also derived from petroleum products, and used to make the chemical reactions which produce the fiber. So even though the cotton and wool fibers are produced "naturally", their production, like that of synthetic fibers, ultimately uses resources and energy. The use of petroleum-based resources causes a negative impact on the environment when the petroleum is extracted.



Once the fibers have been produced, worn as clothing, and discarded, the situation is somewhat different. Because synthetic fibers are human-made and unnatural, they cannot be disposed of without stressing the environment. Ecologically, synthetics are literally indestructible. The soil ecosystem has no means of decomposing the fibers. The synthetic fibers, unlike cotton or wool, will accumulate as garbage or will be destroyed by burning and thus pollute the air.

Have your students find out what kinds of fabrics make up the clothing they wear. Distribute the student activity sheets and have them examine their clothing labels and list the contents. Make a collective list of the different fabrics on the board. Have your students research the source of the fiber and the process used to produce it.

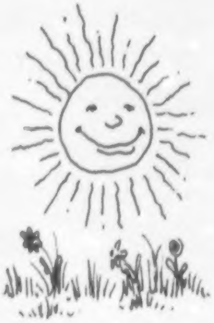
Discuss the pros and cons of synthetic and natural fibers and their impact on the environment. Since the production of all fibers has an impact on the land, the purpose here is not necessarily to decide which fabrics should be worn, but to raise your students' awareness regarding the production of the clothes they wear every day.

Ask your students to think about where the clothes they discard end up. See if they think all fibers will decompose. To find out, have them bury samples of wool, cotton, polyester and acrylic on the school grounds. Bury each piece of fabric in a hole about six inches deep. Mark where they are buried and dig them up in a month. What happened? Talk about minimizing the environmental impact by recycling clothing. See who can come up with the most creative list for uses of an old sock or mitten.

SUNSHINE ENERGY

OBJECTIVE: Students will investigate the heating power of the sun and the local use of solar collectors.
MATERIALS: Three styrofoam cups, three thermometers, black paint.
TIME: One hour plus optional field trip.

We, as a nation, have been relying on fossil fuels or nonrenewable resources for our energy needs. There are many problems associated with the use of these materials. The fossil fuels, petroleum, natural gas, and coal are found within the earth and must be extracted. Their production alters the landscape and their use releases pollutants into the air and water. They are all nonrenewable and as we use up our reserves our energy future becomes more uncertain.



Solar energy is the oldest energy source exploited by human society (in the form of windmills, wood, sailing vessels, and agriculture). In a one-to-two week period, the sun transmits more energy to the Earth's surface than all of the energy stored in the Earth's known reserves of coal, oil, and natural gas. Each year, more than 500 times as much energy is radiated from the sun to the surface of the U.S., as we consume in all conventional forms of energy. The sun is the most inexhaustible and the cleanest source of energy known. The challenge is to capture the sun's heat and concentrate it into a useable source of energy. This challenge is being successfully met and utilized by an increasing number of consumers as they turn to the sun as an alternative to fossil fuels.

The purpose of this activity is to help your students understand how solar power works and to see how it is being used in your community. Begin with a simple experiment out on your school grounds on a sunny day. You will need to paint a styrofoam cup black. Then fill three cups with cold water. Have students place one cup in the shade and the black cup and a white one in the sun. Place a thermometer in each cup and have students record the temperature at regular intervals. What are the differences in temperature? Why does the water in the black cup become hotter? Why are many solar collectors black?*

Ask your students if anyone has observed a solar collector on homes or buildings in the city. Make arrangements to take a solar tour in your city. The architecture department at a local college may provide you with information on location of solar collectors in the community. Have students prepare some questions they would like answered before going on your tour. Students could also investigate whether your state provides incentives for the installation of renewable energy systems. Some states have refund programs to reimburse individuals or businesses who install solar collectors or wind generators. The class could write to state legislators supporting the initiation of such incentives if they don't exist.

*Adapted from Science Activities In Energy, U.S. Dept. of Energy

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

MOTHER EARTH

OBJECTIVE: Students will express their feelings about our responsibility to live in harmony with the land while creating a traveling display depicting the many ways we are tied to the Earth.

MATERIALS: Arts and crafts supplies dependent on students' design needs

TIME: Two or three 1-hour sessions

This is an open-ended activity which should allow your students to cooperatively interact on a creative venture which will summarize their feelings about their relationship to "Mother Earth". The end product should be a traveling display which they could proudly present to other classes, other schools or even set up in local shopping centers or libraries.

Students could begin by brainstorming a list of all the ways they are dependent on the Earth. From that list should come some ideas for presenting that information to others. They may decide to have teams of students work on representing different items on the list. They may want to express their relationship to the land written in story format, in poetry, verbally on tape, through photographs, drawings, paintings, soft sculpture, etc. They should come up with a theme such as Native American philosophy, or a celebration of life-giving qualities of the Earth, or getting involved with conservation, and work from there. Ask for volunteers to write letters to local organizations requesting space to set up their display for others to view it.

Encourage your students to express their feelings about our responsibility to live in harmony with the land. Is it our responsibility? Can the actions of one person make a difference? What kinds of actions does living in harmony with the Earth require?

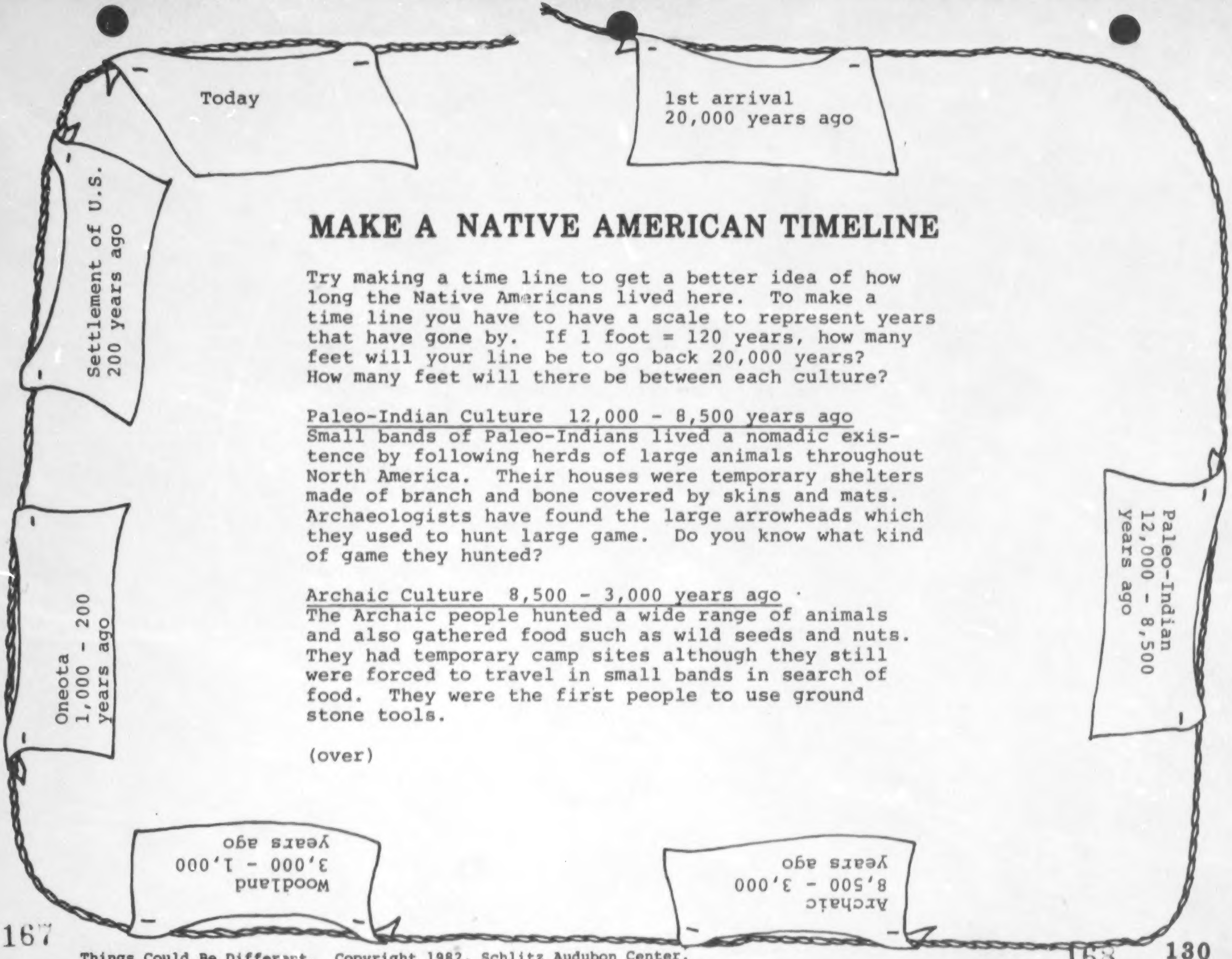
Extensions....

Students could investigate the lifestyles of Native Americans on the prairie or along the coasts. How were their needs met by these different environments?

Have your class investigate the use of nationally-owned forests by various agencies (general public, lumber companies and mining interests). How can we obtain the resources we need and enjoy the forests with a minimal impact on the land?

Students could find out about other cooperatives in your city. Have them interview people involved and find out how the co-op serves the community and how they might affect the local environment.

Students could also examine the food production issue in more detail. What foods are being produced locally? Are marginal lands being farmed? Is soil erosion an issue of local concern? Should it be?


Today
1st arrival
20,000 years ago
Paleo-Indian
12,000 - 8,500
years ago
Archaic
8,500 - 3,000
years ago
Woodland
3,000 - 1,000
years ago
Oneota
1,000 - 200
years ago
Settlement of U.S.
200 years ago

MAKE A NATIVE AMERICAN TIMELINE

Try making a time line to get a better idea of how long the Native Americans lived here. To make a time line you have to have a scale to represent years that have gone by. If 1 foot = 120 years, how many feet will your line be to go back 20,000 years? How many feet will there be between each culture?

Paleo-Indian Culture 12,000 - 8,500 years ago
Small bands of Paleo-Indians lived a nomadic existence by following herds of large animals throughout North America. Their houses were temporary shelters made of branch and bone covered by skins and mats. Archaeologists have found the large arrowheads which they used to hunt large game. Do you know what kind of game they hunted?

Archaic Culture 8,500 - 3,000 years ago
The Archaic people hunted a wide range of animals and also gathered food such as wild seeds and nuts. They had temporary camp sites although they still were forced to travel in small bands in search of food. They were the first people to use ground stone tools.

(over)

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

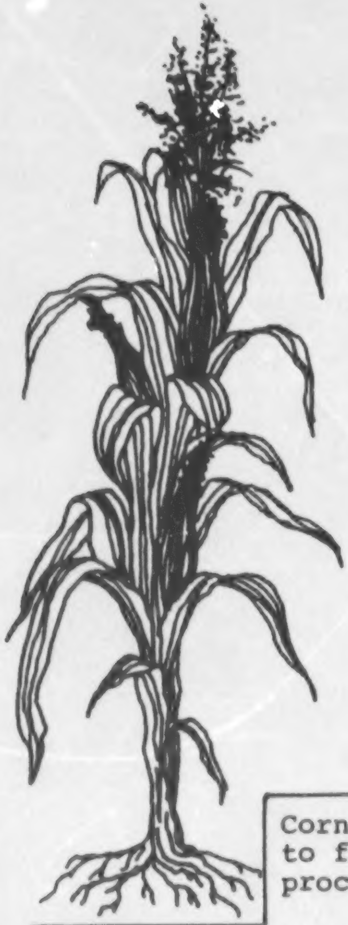
Woodland Culture 3,000 - 1,000 years ago

The Woodland people lived in villages in the eastern half of the U.S. They found plant foods and hunted small game near their villages. Pieces of pottery and burial mounds provide clues to their village sites. They were the first people to make pottery. What did cultures before them use for containers? Why were the Woodland peoples' arrowheads smaller than the Paleo-Indian peoples?

Oneota Culture 1,000 - 200 years ago

The Oneota people lived in large permanent villages along major rivers in the Midwest. They farmed the land and remained in their villages for long periods of time except when they went off to hunt for bison in the summer and winter months. What kinds of crops do you think they grew?

FROM THE FARM TO THE TABLE



Corn harvested on the farm.

Corn brought to factory for processing.

Corn put in package and frozen.

Corn is delivered to the store in refrigerated truck.

You drive to store and buy corn.

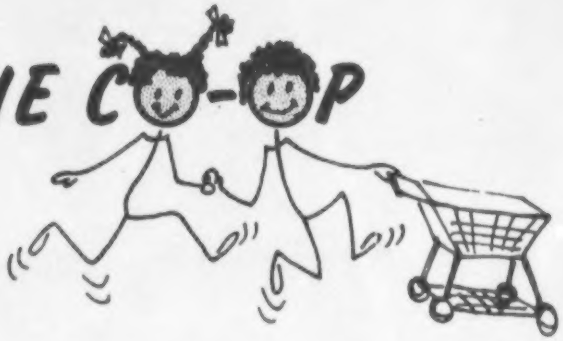
Take corn home and freeze it.

Cook it and eat it.

TRANSPARENCY

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

SHOPPIN' AT THE CO-OP



What is a co-op? Who owns it?

When you shop at the co-op do you find most of the food frozen, in cans, in packages or unwrapped in bins?

Which items are sold in returnable containers?

Would you want to shop in a store where you had to bring your own bags and containers? Why or why not?

What kinds of processed foods are sold at the co-op?

How is the co-op different from other food stores? List all of the differences you can find.

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

FINDING OUT ABOUT FIBERS

Take a look at the labels on the clothes you are wearing. Where did the fabric come from? What will happen to it when you throw it away?

List the contents on the clothing	Where does each fabric come from?			Is the fabric biodegradable?	
labels	Plant	Animal	Synthetic	Yes	No
1.					
2.					
3.					
4.					
5.					
6.					

How can you find out which fabrics are biodegradable? Try this! Bury some samples of natural and synthetic fibers. Then dig them up in 30 days and see what happened. Be sure to mark where you bury them.

Bury a sample of each of the following and then record the results.

Fabric	After 30 days
Cotton	
Wool	
Polyester	
Acrylic	

Things Could Be Different. Copyright 1982, Schlitz Audubon Center.

INDEX TO OUTDOOR ACTIVITIES

Unit and Activity	On School Grounds	In Immediate Area	Away from School
1. Checking Out the Neighborhood			
Shelter in the Neighborhood		X	
Places People Work		X	
Nature in the Neighborhood		X	
Find It on My Map		X	
2. Looking Back			
Tree History	X		
Vacant Lot Archaeology		X	
Rocks to Buildings		X	
3. Back to Basics			
(All activities are indoors)			
4. Going Places			
Movin' Around My City			X *
5. Water, Water Everywhere			
Where Does the Water Go?			X **
6. Natural Neighbors			
Adjectives Hunt	X		
Green Neighbors		X	
Ant Antics	X		
Vacant Lot Food Web		X	
Hidden Worms	X		
Invent a City Critter	X **		
7. Less Is More			
Clean It Up Campaign		X	
Nature's Clean-Up Crew	X		
Worm's the Word	X		
Make a Recycling Jar	X **		
Where Is Away?			X
Checking Out the Supermarket			X *
8. Enough for Everyone?			
Noise Makers - The sounds around you		X	
9. Movin' Out			
Living in the Fast Lane			X *
The Air We Breathe		X	

Unit and Activity	On School Grounds	In Immediate Area	Away from School
10. Water We Losing?			
Water Dwellers			X
Mini-Rivers	X		
From the Ground Down	X		
Going Down		X	
11. Things Could Be Different			
Native American Time Line	X *		
A Woodland Visit			X
Shoppin' at the Co-op			X
Finding Out About Fibers	X		
Sunshine Energy	X		X *

* On own
** Denotes optional outdoor experience

TOPIC INDEX

ADAPTATIONS
Nature in the Neighborhood 8
Hidden Worms 55
Invent a City Critter 55
Nature's Clean-up Crew 65
Water Dwellers 106

AIR QUALITY
Places People Work 7
Movin' Around My City 34
From Canoes, To Cars, To ... 35
The Day the Cars Disappeared 36
Conserve It! 80
Living in the Fast Lane 90
The Air We Breathe 91
On the Right Track? 93

ANIMALS
Nature in the Neighborhood 8
Ant Antics 51
Vacant Lot Food Web 53
Hidden Worms 55
Invent a City Critter 55
Nature's Clean-up Crew 65
Worm's the Word 66
Make a Recycling Jar 67
Water Dwellers 106
Going Down 110

CONSERVATION
Looking Back 14
Vacant Lot Archaeology 16
What Are We Consuming? 24
Back to Basics 26
Wanted: Environmental Helpers 28
From Canoes, To Cars, To ... 35
Water Cycles 41
Where Does the Water Go? 42
My Water Record 43
Water Figures 44
Where Is Away? 68
Checking Out the Supermarket 69
Concerned Consumer Survey 70
Move Over! 76
Food for Thought 78
Resources for All? 79
Conserve It! 80
The Year 2001 81
Land Use Planning for the Future 94
Nature's Sponges 108
Going Down 110
Water Equality 112
From the Farm to My Table 124
Shopping at the Co-op 125
Sunshine Energy 126
Mother Earth 128

CONSUMER
Places People Work 7
Looking Back 14
Vacant Lot Archaeology 16
What Are We Consuming? 24
Back to Basics? 26
Community Worker's Web 27
Wanted: Environmental Helpers 28
Movin' Around My City 34
From Canoes, To Cars, To ... 35
My Water Record 43
Water Figures 44
Clean It Up Campaign 63
Where Is Away? 68
Checking Out the Supermarket 69
Concerned Consumer Survey 70
Move Over! 76
What's a Billion? 77
Food for Thought 78
Resources for All 79
Living in the Fast Lane 90
On the Right Track? 93
From the Farm to My Table 124
Finding Out about Fibers 125

COOPERATION
Shelter in the Neighborhood 7
Community Worker's Web 27
Clean It Up Campaign 63
The Year 2001 81
Land Use Planning for the Future 94
Water Equality 112
Mother Earth 128

DECOMPOSITION
What Are We Consuming? 24
Back to Basics 26
Clean It Up Campaign 63
Nature's Clean-up Crew 65
Worm's the Word 66
Make a Recycling Jar 67
Where Is Away? 68
Checking Out the Supermarket 69
Living in the Fast Lane 90
Finding Out about Fibers 125

ENERGY

Looking Back 14
What Are We Consuming? 24
Back to Basics? 26
Movin' Around My City 34
Makin' Movin' Graphs 35
From Canoes, To Cars, To ... 35
The Day the Cars Disappeared 36
My Water Record 43
Checking Out the Supermarket 69
Resources for All? 79
Conserve It! 80
The Year 2001 81
People on the Move 90
The Air We Breathe 91
On the Right Track? 93
From the Farm to My Table 124
Shoppin' at the Co-op 125
Finding Out about Fibers 125
Sunshine Energy 126

FOOD

Back to Basics? 26
Checking Out the Supermarket 69
Food for Thought 78
Living in the Fast Lane 90
A Woodland Visit 121
From the Farm to My Table 124
Shoppin' at the Co-op 125

HISTORY

Looking Back 14
Tree History 15
Vacant Lot Archaeology 16
From Canoes, To Cars, To ... 35
Mapping It Up 93
Native American Time Line 120
A Woodland Visit 121

HUMAN COMMUNITY

Shelter in the Neighborhood 7
Places People Work 7
Nature in the Neighborhood 8
Find It on My Map 9
Looking Back 14
Vacant Lot Archaeology 16
Rocks to Buildings 18
Community Worker's Web 27
Wanted: Environmental Helpers 28
Movin' Around My City 34
Water Cycles 41
Where Does the Water Go? 42
Clean It Up Campaign 63
Where Is Away? 68
Checking Out the Supermarket 69
Move Over! 76
Food for Thought 78
Resources for All? 79
Conserve It! 80
Noise Makers - The Sounds Around You 81
The Year 2001 81
People on the Move 90
Living in the Fast Lane 90
Mapping It Up! 93
Land Use Planning for the Future 94
What about the Central City? 96
Water Equality 112
Native American Time Line 120
Shoppin' at the Co-op 125
Sunshine Energy 126
Mother Earth 128

INSECTS

Nature in the Neighborhood 8
Ant Antics 51
Vacant Lot Food Web 53
Nature's Clean-up Crew 65
Make a Recycling Jar 67
Going Down 110

INTERRELATIONSHIPS

Nature in the Neighborhood 8
Community Worker's Web 27
Green Neighbors 50
Vacant Lot Food Web 53
Worm's the Word 66
Water Dwellers 106

LAND USE

Shelter in the Neighborhood 7
Places People Work 7
Nature in the Neighborhood 8
Find It on My Map 9
Looking Back 14
Food for Thought 78
Resources for All? 79
People on the Move 90
Living in the Fast Lane 90
On the Right Track? 93
Mapping It Up! 93
Land Use Planning for the Future 94
What about the Central City? 96

Nature's Sponges 108
From the Ground Down 109
Going Down 110
Mother Earth 128

LIFESTYLES
Shelter in the Neighborhood 7
Places People Work 7
Looking Back 14
Vacant Lot Archaeology 16
What Are We Consuming? 24
Back to Basics? 26
Movin' Around My City 34
From Canoes, To Cars, To ... 35
My Water Record 43
Water Figures 44
Clean It Up Campaign 63
Checking out the Supermarket 69
Concerned Consumer Survey 70
Conserve It? 80
Noise Makers - The Sounds Around You 81
The Year 2001 81
People on the Move 90
Living in the Fast Lane 90
What about the Central City? 96
Water Equality 112
Native American Time Line 120
A Woodland Visit 121
From the Farm to my Table 124
Shoppin' at the Co-op 125
Finding Out about Fibers 125
Sunshine Energy 126

MAPPING
Find It on My Map 9
Looking Back 14
Resources for All? 79
Mapping It Up! 93
Mini-Rivers 107

NATIVE AMERICANS
Looking Back 14
From Canoes, To Cars, To ... 35
Native American Time Line 120
A Woodland Visit 121

NATURAL RESOURCES
Rocks to Buildings 18
What Are We Consuming? 24
Back to Basics? 26
Water Cycles 41
Where Does the Water Go? 42
My Water Record 43
Water Figures 44
Checking out the Supermarket 69
Move Over! 76
Food for Thought 78
Resources for All? 79
Conserve It! 80
The Year 2001 81
Living in the Fast Lane 90
Mini-Rivers 107
Nature's Sponges 108
From the Ground Down 109
Going Down 110
Water Equality 112
A Woodland Visit 121
From the Farm to My Table 124
Finding Out about Fibers 125
Sunshine Energy 126
Mother Earth 128

PLANTS
Nature in the Neighborhood 8
Tree History 15
Green Neighbors 50
Vacant Lot Food Web 53
Make a Recycling Jar 67
Nature's Sponges 108
Going Down 110
A Woodland Visit 121
From the Farm to My Table 124
Finding Out about Fibers 125

POLLUTION
Places People Work 7
Wanted: Environmental Helpers 28
The Day the Cars Disappeared 36
Where Does the Water Go? 42
Clean It Up Campaign 63
Where is Away? 68
Noise Makers - The Sounds Around You 87
Living in the Fast Lane 90
The Air We Breathe 91
Water Dwellers 106
From the Ground Down 109
Water Equality 112

RECYCLING
Vacant Lot Archaeology 16
Back to Basics 26
Water Cycles 41
Where Does the Water Go? 42

Clean It Up Campaign 63
Make a Recycling Jar 67
Where Is Away? 68
Checking out the Supermarket 69
Concerned Consumer Survey 70
Move Over! 76
What about the Central City? 96
Shoppin' at the Co-op 125

ROCKS
Rocks to Buildings 18
Going Down 110

SOILS
Rocks to Buildings 18
Nature's Clean-up Crew 65
Worm's the Word 66
Make a Recycling Jar 67
From the Ground Down 109
Going Down 110
Finding Out about Fibers 125

TRANSPORTATION
Places People Work 7
Looking Back 14
Movin' Around My City 34
Makin' Movin' Graphs 35
From Canoes, To Cars, To ... 35
The Day the Cars Disappeared 36
People on the Move 90
Living in the Fast Lane 90
The Air We Breathe 91
On the Right Track? 93

URBAN SPRAWL
Looking Back 14
Movin' Around My City 34
People on the Move 89
Living in the Fast Lane 90
The Air We Breathe 91
On the Right Track? 93
Mapping It Up! 93
Land Use Planning for the Future 94
What about the Central City? 96

WATER
Water Cycles 41
Where Does the Water Go? 42
My Water Record 43
Water Figures 44
Water Dwellers 106
Mini-Rivers 107
Nature's Sponges 108
From the Ground Down 109
Water Equality 112